Maker education in mathematics
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What is maker education?

A makerspace is a lot of things but mainly a creative space where people gather to create things. 

The key distinction which is often neglected however is that it’s a place where people come together using technology ordinarily not available to them!
Experience Overview

- Literature review and PD
  - Science, Technology, Engineering, Art, and Mathematics (STEAM), Maker Education, Mathematics, Students-as-Partners (SaP’s), and Computational Thinking
- Data Analysis (2020/2021)
- Ethics approval

- Developing a Maker Ed website
- Exploring tools and technologies relating to our field
- Creating resources to recruit participants
- Planning and developing a STEAM camp
- Assisting with the execution of research projects
  - STEAM learning within the BIPOC community
  - Developing surveys
- Supporting the execution of a 3-Day STEAM camp
- Learning about the benefits and challenges of STEAM learning within a virtual setting
To guide our study, we engaged in a literature review to enhance our understanding of the work we would engage with over the course of the USRI program. Key authors include Lyn English, Seymour Papert, Jean Piaget, John Dewey and George Gadanidis. Here are a few key articles:


**Key Concepts**

**Computational Thinking → Computational Participation**

**Agency**

“According to Felton & Koestler (2012), building teacher efficacy in mathematics and offering student centred learning approaches can support educators in applying more progressive pedagogies that can lead to more equitable mathematics education, for all students. This form of pedagogical practice is student driven rather than teacher centred.”

**Constructionism**

“Students require relationships in order to provide a context to their learning (Dewey, 1944). Both Dewey and Socrates shared a common belief that active inquiry should not only be used to gain knowledge but also guide how to act (Dewey, 1944)”
Initially, we were continuing the work on an article with a focus on preparing teachings to use Maker Education for teaching Mathematics. In March 2021, the Maker Ed Team hosted a guest lecture for all first year students who were enrolled in the primary/junior streams within the Faculty of Education at Western. In these sessions, students learned about Maker Education and engaged in modules about Micro:bit. As part of our experience in the USRI program, we analyzed the data to search for themes.

**How did you feel before you completed the task?**

- Overwhelmed
- Nervous
- Intimidated
- Confused
- Unsure
- Anxious
- Thought it would be easy
- Terrified
- Good
- Comfortable
- Confident
- Excited to learn
- Frustrated
- Semi-confident

**How did you feel after you completed the task?**

- Accomplished
- Confident
- Excited
- Proud
- Confident
- Happy
- Impressed
- Rewarding
- Satisfied
- Amazing
- Blow away
- Educated
- Best activity
- I like coding
- I got this
- Easier
- Not very confident
- Competent
- Good
- I feel it
- Satisfied
- Good
A Maker Education website was developed so that the Western Makers team could share resources and webinars that are used to support pedagogical learning for teacher candidates and the greater educational community.

It will continuously be updated as new events arise and new resources present themselves.
Marketing ads/posts developed

Western Makers

Steam Camp

Comes explore math & coding!

August 17-19, 2021
10am-noon

Grades 5-8
A STEAM camp with a focus on mathematics was developed and conducted to facilitate learning of STEAM through a mathematics lens while making inter-curricular connections. In addition to the online platforms, student were provided kits to have the opportunity to work on the activities concretely and to ensure that every student had an equitable opportunity in participating.

The Western Education Research team is offering a FREE STEAM Education camp for students in grade 3-8 this summer.

Camp Attendees will explore a variety of dynamic mathematics & coding challenges. The STEAM camp will run for 3 days in August for 2 hours each day. If you have interest in participating please complete the 'Expression of Interest' Form on the right.

Below you will find some key information pertaining to the camp.

What: Western Education STEAM Camp (Mathematics & Coding Focus)
When: From Aug 17th-19th (Online via Zoom)
Time: 10:00 am-noon
Cost: FREE
Requirements:
- Students from grade(s) 3-8
- High Speed Internet Connection
- A device with a USB port
- Willingness to support research
Tools & Technologies Explored

- Python
- Minecraft Education Edition
- Scratch Jr.
- Tinkercad
- Micro:bit
- CoSpaces Edu
Summer Camp Topics

Day 1
Patterning & Coding
micro:bit

Day 2
Symmetry
TINKERCAD

Day 3
3D Design
I had such a good time rotating, putting together, and lifting 3d objects in tinkercad. It was really fun and addicting. Knowing that yesterday’s session was amazing, I knew today’s would be more than amazing. But I was wrong. It was QuadRipPle amazing. I did good but I think I can learn more.

I learned how to code a micro:bit! It was stressful at first but I feel better now and want to learn more.

I learnt so much today, I can’t even believe it. Thank you so much!!! I’m trying to make my micro:bit work, and I’m challenging myself in ways that I thought I never would;)
Use of Maker Education in the classroom continues to be more prominent and of interest for both teachers and students to learn.

Computational participation is a growing concept that enhances computational thinking.

Mathematics can be the focus of STEAM learning and should continue to be incorporated.

We are excited to continue learning about Maker Education as we continue working on the initial article and with the Maker Education team throughout the 2021-2022 academic year.
Thank you!