Computational Thinking in Mathematics Education

Community of Practice

Grades 2/3, St. Andrews PS, TDSB
Why CT + Math?

• It’s a back-to-the-future idea

• Math + CT was the focus in the 1970s/1980s, with Logo: Papert (1980) said, Logo is to math what living in France is to learning French.

• Today we have a CT (or coding) focus, but it’s mostly not connected with math

• Math and CT share complementary affordances

• For example, here are 5 CT affordances that support math teaching/learning: agency, access, abstraction, automation, audience
CoP Sites 2017

- **Wellington CDSB**, Grades 3-6 [Jeff Cummings, Bryan McMillan, George Gadanidis, Chantal Buteau, Erin Clemens]

- **Rainy River** [Bev Caswell, Joan Moss]

- **St Andrews PS, TDSB** [Ralph Walker, Bev Caswell, George Gadanidis, Joan Moss]

- **Western Faculty of Education** [PJ/JI/IS math + CT course instructors]
Related Projects

SSHRC PDG on CT in Mathematics Education
- 10 universities across Canada, 6 international
- K to undergraduate mathematics
- In process of applying for much larger grant
- ctmath.ca

ORF app development/research
- 1/3 of story-based, math + CT apps
- eduapps.ca
- researchideas.ca/sym/s1/
2017-2018

- **Wellington CDSB:**
  - Elementary: Leadership Projects
  - Secondary: Grade 10 Math + Comp.Sci. Cohorts

- **St Andrews PS + Rainy River collaboration**

- **Western Faculty of Education:** refined Math + CT integration

- Offer mathematics-based activities for **hour of code**. How do we “sell” this?

- Expand our Ontario, national and international partners

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**Student:** In our first attempt, we figured out we had to change the position, that is, x and y. So, our first try was 500 and 295. Then, we figured out that to start from right to left, we had to change the direction angle from 0 to 180.

**Teacher:** Did that work?

**Student:** Not exactly, you see?
Elementary Leadership Project in Math + Coding

Project Focus:

• Empower educators to show leadership and mentor others to continue the growth of Math + Coding activities in elementary classes in Wellington Catholic District School to increase engagement in Mathematics and promote 21st Century learning skills.
Mentorship Model

- Coding Leads will mentor a colleague in delivering Math + Coding activities in their respective classrooms

- Several methods will be utilized
  - Co-teaching/ Coaching
  - Lesson Study
  - Professional Learning Community
Outcomes

• Continue to develop vibrant shareable resources and activities

• Create student voice opportunities to share learning using a variety of digital learning tools (#WEcode)

• Provide intensive professional learning opportunity to learning teams at target school sites

• Provide professional learning opportunities to non-participating schools in our board through Leadership opportunity (#WEinitiative)
Grade 10 Math + Computer Science Cohort Project

The Program

• Opportunity for students to receive two credits with a focus on computational skill to solve mathematical problems.

• Integration of mathematics tasks with computational thinking to problem solve and create real life solutions using code.

• Student learning products could be the construction of apps, games, robotics, and programs to solve real life problems (“Passion Projects”)

Outcomes

• Goal to attract and increase the number of female students taking computer science

• Support inclusive learning environment for disengaged students (eg. Applied learners in Math)

• Promote modern learning environments that emphasize collaboration, creativity and critical thinking skill (redefine the learning space)