



WELLINGTON CATHOLIC NEWS

Coding for All: a story of purpose

Wellington Catholic is on the leading and learning edge. Imagine a modern learning environment, fun virtual spaces, curiosity cubed, collaboration, and high achievement levels ... a place where all students achieve success. *Coding for All* is an inspiring story of an innovative learning journey.

This is about passion and purpose, connecting people with a variety of skill sets and creating exceptional learning opportunities.

Our vision for our learners is to empower students to develop technological and learning skills for success in a rapidly changing global world.

Wellington Catholic begins with “We”, and #WECode!



Coding and Math Overview

Two years ago, the Wellington Catholic District School Board (WCDSB) began an exciting and innovative journey with Western University professor Dr. George Gadanidis, more commonly known as “Dr. George”. Together Dr. George and our staff began to explore ways to integrate computer coding into mathematics teaching and learning. We wanted to help students problem-solve, investigate and develop a better understanding of mathematical concepts and we did so by building a strong link between coding and math.

Wellington Catholic, in partnership with the Math Knowledge Network, has successfully integrated coding into the grade 3–6 curriculum (see student stories on pages 5–6), and this year introduced the Grade 10 Mathematics and Coding Double Credit Program whereby students can earn their compulsory Grade 10 Math credit and a Grade 10 Computer Science credit, simultaneously.



Research shows that this integration is becoming increasingly more important since computer coding relies heavily on math concepts. Coding also encourages problem solving skill development as it provides real world challenges and students experience immediate feedback. The Ontario Math Curriculum lists problem solving as one of the first mathematical processes to be developed in students. Our innovative approach at Wellington CDSB to achieve this is to strengthen the link between coding and math.

Equally important for our students:

- coding is engaging and makes learning math fun;

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- math concepts become tangible when students can manipulate objects on the screen;
- math concepts become dynamic when students change a value and see the effect on the screen;
- the student takes control of his/her learning as they explore variations and related ideas.

In the process of learning to code, students make many discoveries. They are not just learning to code, they are coding to learn. In addition to learning mathematical and computational ideas, they also build strategies for designing projects and communicating ideas. These skills are useful not just for computer scientists but for everyone, regardless of age, background, interests or occupation.

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Wellington Catholic students in elementary and secondary are learning first hand that coding is an opportunity to test their problem-solving knowledge through exploration, experimentation and simulation. The new grade 10 course launched this year, for example, gives students the opportunity to work on their own device (coding is not platform dependent) in an inclusive environment where they are working on solving problems in a group setting.

Meet some the WCDSB's coding instructors



Dr. George Gadanidis, PhD
Western University, Researcher
and Partner Professor

I started off many years ago as a teacher and math consultant. I spend 50–60 days each year in elementary school classrooms, collaborating with teachers to design cool ways of engaging children and youth with big math ideas. The opportunity to combine coding and math in elementary and secondary classrooms is exciting and inspirational.

#HerelAm integrating computational math and coding. Fun, exciting, collaborative learning.



Jeff Cummings, Technology Enabled Learning Coordinator, Project Champion

My background is in technology and my passion is to advance the learning opportunities for our students in

coding. Being a part of a project that is innovative, changes classroom culture, and redesigns the learning experience within the curriculum. That really inspires me. This program is a great way to engage students in their math courses and provide them the opportunity to use technology at a high-level and interact with a teacher in unique and engaging ways.

#HerelAm advancing learning opportunities for students.



Alan Yeung, Computer Science Teacher, St. James Catholic High School

I love looking at problem solving through abstract forms. From Sudoku puzzles to Logic Gate diagrams, I am fascinated by finding solutions and algorithms by thinking outside the box. So, when the opportunity arose for me to teach math, combined with coding, I jumped at it. When teaching math, it's important for students to understand how they can apply what they are learning to real world contexts. That is what we are doing with the Grade 10 Math & Coding Double Credit Program.

#HerelAm Passionate about real coding, real life.



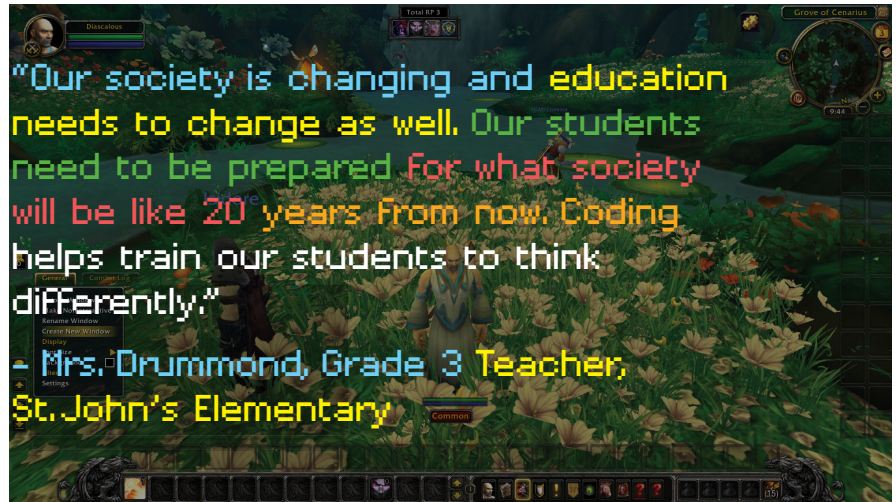
Melanie Drummond, Gr. 3 Teacher, St. John Catholic School

I work with elementary students to explore coding, in the classroom and in a weekly Coding Club. I have always loved learning Math, but when I was younger Math was taught differently. I was good at “understanding” concepts, but didn’t get the opportunity to apply concepts and communicate my thinking. Today, teachers encourage students to think of multiple methods to solve a problem, use hands-on materials and explain thinking in variety of ways.

When I became a teacher, I began to deconstruct Math concepts and intently observe all the incredible ways kids view Math. I knew that if I was learning more about Math by listening to different ways of thinking, then my students would too.

Coding is a hands-on tool that enables kids to communicate, explore and be successful, even if they haven’t previously felt strong in math. I like that coding makes Math more accessible so all students are excited to learn. Anything that engages my students like coding does is a welcome addition to my classroom!

#HereIAm a lifelong learner.

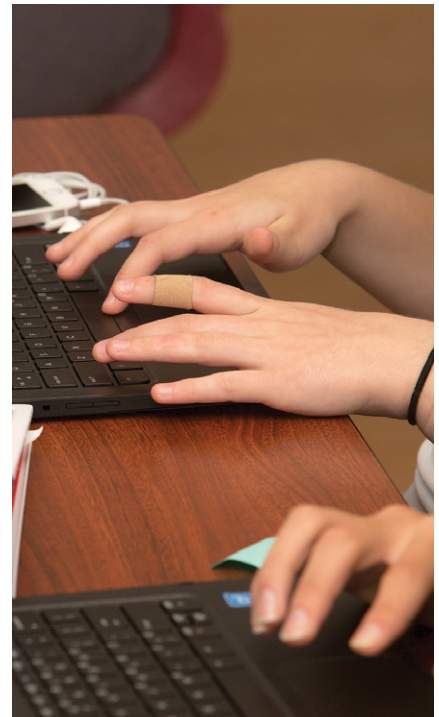


Judy Mullen, Gr. 3 Teacher, St. Michael Catholic School

Our Elementary Leadership in Math and Coding Project consists of a team of lead educators who work together to increase student engagement, promote 21st century learning skills, and grow computational thinking in the math classroom. We regularly integrate coding into our math lessons, have started coding clubs at our schools, and promote and host coding events, including Hour of Code™. There are very few things that excite a room full of learners like coding! I love that my students discover new math concepts on their own and at their own pace. They become the experts in the room working collaboratively and confidently to solve real

math problems together. It’s wonderful to see and hear students working through math problems, sharing ideas, debugging algorithms, and celebrating each other’s successes.

#HereIAm creating the conditions for engaged learning.



Here are some of our budding student coders



Gabriel, Gr. 10 Student, St. James Catholic Secondary School

When I first found out about the Grade 10 Math & Coding Double Credit Program I was excited. Math has been an okay subject for me and I have always really enjoyed coding so I thought this course would make math seem a little more fun. And I was right.

This course is legitimately fun! Coding makes math easier for me to learn and gives me a deeper understanding of the concepts. I look at 1's and 0's (the universal coding language) and I know what they mean.

One of my favourite projects was creating a ping pong game by using math to solve the code. Now when I play my favourite games on Xbox I know how much work went into developing these games.

I can already see how can I apply the things I am learning in this course. I hope to pursue a career in robotics or electronics. Robots seem to be taking people's jobs but if you're the one making the robots your job can't be stolen.

#HerelAm working on math, coding and job security.

Maya, Gr. 10 Student, St. James Catholic Secondary School

I decided to take the Grade 10 Math & Coding Double Credit Program because it was different. I have always enjoyed math and the fact that I could get an additional credit in Computer Sciences, something that I wasn't as interested in, helped me decide to take the course. This course is definitely a different way of learning.

One of my favourite parts about



the course is that it's a double credit so there is a lot of time to work on projects and really understand things. Before the course, I didn't know anything about Scratch. Now I know how to make things move across the screen using math and code. It takes me a bit of time to figure out the code but once I accomplish it I feel proud that I made that object move by telling it what to do!

#HerelAm deepening my learning in mathematics and science.

Nicole, Gr. 4 Student, St. John's Elementary School

When I first started learning Scratch last year, I didn't know much about how to build a computer program but after a year and a lot and practice I am



now helping out with the coding club at my school, learning different coding languages and building my own "mini-worlds" in Scratch.

We started learning about coding and math last year in Grade 3, when Dr. George came into our class. His program teaches us fun, new ways to learn math concepts using the Scratch program. I really enjoy when he comes into our classroom and teaches us new skills. My friends and I are able to work together in the classroom, and I can also take it home and practice.

I am hoping one day to become a computer programmer, because I think this stuff is really neat.

#HerelAm Future Computer Programmer.



Lucien, Gr. 3 Student, St. Michael's Elementary School

I started Grade 3 with no idea that I would be learning math on computers through coding. I enjoy coding in Scratch and other programs and have really grown to love it. My favourite parts about coding are being able to

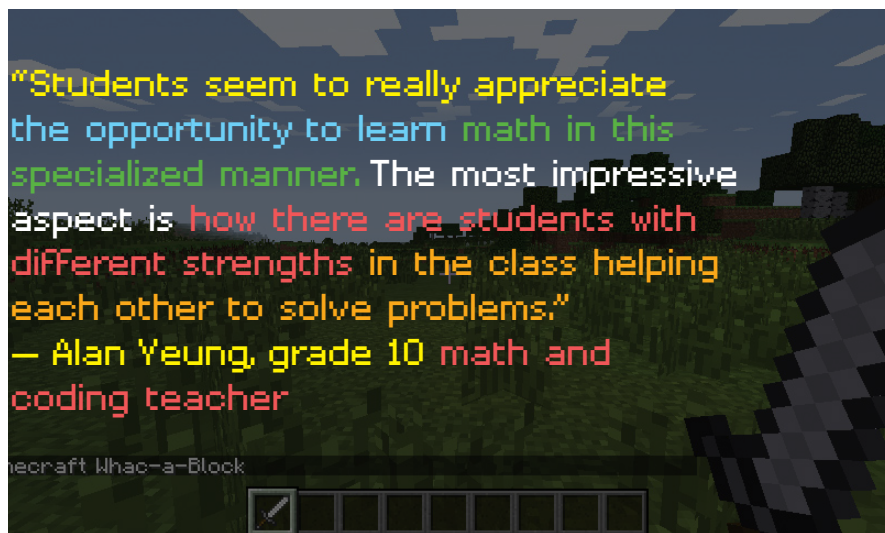
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Why coding?

Computer coding is everywhere and most of us don't even know it! Coding can already be found in the most unusual places including a car engine, programmable logic controllers (PLC) used in high end manufacturing, formulas in spreadsheets, computers, and

literally thousands of other real world applications.

From cellphone apps to the newest artificial intelligence (AI) technologies in home speakers, coding and math are involved in virtually every aspect of life. Coding is preparing students for the jobs of today and for a future and jobs that have yet to be created.



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make designs with squares and making games.

Learning how to do this makes me want to learn how to make video games, and all of this knowledge may help me someday when I hope to start my own mining company. I am so happy that I am able to be a part of coding in the classroom and am happy that I am so good at it. I look forward every day to learning more and growing my coding and math skills.

#HereIAm loving learning and growing my skills.



#HEREIAM FAMILY STORY

Parent Feedback Songs

ELEMENTARY STUDENTS

After elementary students tried coding in their math/geometry classes, they shared what they learned at home. We asked parents to return comments to their teacher on "What my child shared" and "What I learned". All of the feedback was very positive!

These comments were transcribed, organized into themes and made into songs with thanks to our musician friend Ian Parliament. On Dr. George's website, you can hear the actual recordings of students singing the songs. Check them out by visiting: researchideas.ca/wmt/c6b1.html



OUR CODING PARTNERSHIPS

Wellington Catholic is a partner on the new KNAER (Knowledge Network for Applied Education Research), Mathematics Knowledge Network (mkn-rcm.ca) and on the leadership team of the MKN's Community of Practice on Computational Thinking in Mathematics Education, that informs classroom practice and helps create innovative learning environments across the province that take advantage of computational thinking.

There are many members of our staff and board teams who are a part of the project. We would like to

thank the following schools for their commitment and contributions to the project.

Elementary Coding:

- St. Francis of Assisi Catholic School
- St. Michael Catholic School
- St. John Catholic School
- St. Patrick Catholic School

Secondary Coding:

- Bishop Macdonell CHS
- St. James CHS

For more information about coding at Wellington Catholic visit wellingtoncdsb.ca.

For more information about Dr. George Gadanidis and his work visit <http://imaginethis.ca/>

About the WCDSB

The Wellington Catholic District School Board is committed to supporting student success in all of our 22 schools. Our academic and extracurricular programs give our 7,800 students the opportunity to learn, lead and serve. Grounded in faith based teaching, our schools are preparing students with the values and academic skills they need to be successful 21st century citizens.

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Mathematics Knowledge Network
Réseau de connaissances en mathématiques