



“We’re using technology to create possibilities in every classroom, for every child, every day.”

- Mark Carbone,
CIO,
Waterloo Region District School Board



Using Technology to Inspire Curiosity, Creativity, and Life-Long Learners

“The whole world is a web-enabled space,” exclaimed Mark Carbone, “and we have an obligation to ensure that each child can succeed and flourish wherever their journey takes them.” As CIO of the 60,000 student, Ontario-based, Waterloo Region District School Board (WRDSB), Carbone is uniquely positioned to make this responsibility a reality.

Under Carbone’s leadership, the forward-thinking school board has utilized best-in-class technologies to help instill the knowledge, skills, and attitudes necessary for life beyond its classroom walls. However, in order to be successful it has been necessary to change perceptions of how technology is viewed. “People always expect to see immediate results when implementing technology in education, but you can’t throw technology into a classroom and expect to see a spike in test results. That’s just not how it works,” Carbone observed.

“You have to use technology to cultivate creativity and academic curiosity, and then encourage students to do their own research, to share, collaborate, and even conceive their own projects. This is how you change the paradigm.”

He continued, “Once you stimulate a child’s inquisitiveness and provide them with the right tools to support their goals, that’s when test scores go through the roof. You end up graduating a whole generation of self-starters, each one capable of making a tangible impact on the world.”

Details

Customer: Waterloo Region District School Board

Industry: Education

Location: Ontario, Canada

Impact

- Tangible improvements in academic performance
- Students equipped to thrive outside of the classroom
- Pervasive, open wireless network facilitates learning, research, and collaboration

Fortinet Solutions

- Fortinet FortiAP Access Points (>4,800 units)
- Fortinet MC4200 Wireless Controllers (20 units)
- Fortinet FortiWLM Wireless Manager

Testing the Waters

One of the school board's first forays into the applied use of technology involved a pilot that provided iPods to several classes of students. Carbone recounted, "We deliberately didn't impose any expectations on what staff and students could do. It was important to have a time of exploration, and they were curious. Through the Futures Forum project, students who were taught in a technology-enabled, inquiry-based, and collaborative environment scored 2-5 percent higher in their assessments. This was a fantastic result and great validation that our thinking was on track."

Technology that Enables

At WRDSB, technology is viewed as a fundamental enabler for student development. Carbone and his team have developed a core set of principles to guide the selection and deployment of equipment. The first principle is that if technology does not work it will not be adopted. "If it takes a teacher twenty minutes to get a class signed into an application, half the lesson time has been lost. Technology has suddenly become an obstacle, not an enabler," stated Carbone.

Every 9th grade pupil is issued a Chromebook laptop, which they keep for the duration of their secondary school studies. The board has over 22,000 Chromebooks and 12,000 iPad devices allocated across the different grades. At any given point in time, the district has in excess of 50,000 devices connecting to its wireless network spanning 116 individual schools with 99.9% wireless coverage, including BYOD devices.

As part of its technology backbone, the WRDSB infrastructure includes a significant number of Fortinet devices. To date, over 4,800 Fortinet access points [APs] have been deployed across the schools, connected using a high-availability configuration into a series of Fortinet MC4200 Wireless Controllers. Each controller has a 4 Gbps bonded connection into a pair of switches for cross-stack redundancy. Power to the central controllers is split between two separate uninterruptible power supplies, and backed up with auto-switching generators. FortiWLM Wireless Manager is utilized to manage the network infrastructure and to provide additional configuration, security, and performance capabilities.

Mike Zamin, network infrastructure supervisor and one of the school board's key architects, noted, "Our team

is very modestly-sized for such a large environment, but we're still able to comfortably manage the thousands of Fortinet access points and network components to ensure we continually provide premium levels of service. With APs in almost every classroom, the Fortinet wireless network gives us tremendous flexibility and scalability as we continue to increase the scope of our deployment. Impressively, the Fortinet AP infrastructure has become our go-to connection for speed; currently giving us twice the throughput of the wired network."

"High-availability, speed and density of coverage are all 'must-haves' in our environment," commented Carbone. "It's imperative for IT to take the perspectives of the students and teachers, and to fully internalize what needs to occur to really optimize the learning opportunity. Our role is to pick best-in-class technologies that are capable of delivering the right experience."

He added, "Creating a video chat session between Waterloo students and a school halfway around the world is an incredible, teachable moment that would not have been possible without the technology we've deployed. Now imagine the disappointment and frustration if that call won't go through, it drops, lags, or is pixelated. Our infrastructure simply needs to work as expected. I'm proud to say, at Waterloo it does."

Recognized as Leaders

As testimony to the innovation and ground-breaking work being performed, the school board frequently hosts an annual series of Google summits focused on education. One of the board's schools was recently honored with an invitation to participate in the opening of Google's newest Canadian location, presided over by Prime Minister, Justin Trudeau. To their surprise and delight, Mr. Trudeau spent time with the 7th graders to create a 3-D selfie.

Moving the Needle

The measurement of progress is an important aspect of the IT team's charter; providing insights into what is having an impact and what needs to be improved. Carbone has established a unique set of benchmarks against which he continually tests his department and its growing infrastructure. He revealed, "My favorite metric is also one of the simplest: How much bandwidth we're using. Students and staff need access to a variety of digital resources and tools within the context of a globally

connected classroom. Never before in history have educators had such a clear measure for the information being utilized and shared by students. And the wonderful thing is that we're doubling our throughput every 15 months."

Instilling Responsibility

Another of the IT team's tenets is to educate students to be good citizens of the Internet. The district replaced its original acceptable use policy with guidelines for responsible use. Zamin recalled witnessing student-driven responsible use in action. "I was observing a 9th grade class working on an online assignment together. Several students noticed a group trying to hack the original problem and called it out as cheating. The teacher stopped the class and let the pupils decide whether this constituted cheating or thinking outside the box. The situation was used as a catalyst for a very powerful conversation and learning opportunity."

Carbone added, "We try to make access to information as open as possible but still create a protected environment where students can have real experiences to navigate the digital landscape, and learn when to ask for an adult's advice. We won't be able to watch these kids forever, so instead we teach them that their actions have consequences and continually reinforce the importance of acting responsibly."

Zamin remarked, "Right from the outset, it was obvious that the network was a critical element in making Mark's vision a reality. Our partnership with Fortinet has enabled us to create a pervasive, secure infrastructure that still provides the freedom to explore."

The overarching principle that guides the entire evolution of Waterloo's environment is to never stop learning and growing. The district's educators strive to maintain the humility necessary to be lifelong learners themselves. "The Internet provides the vehicle to chase your passions, consume information, contribute your own thoughts, and find your own community. These are all life lessons. When technology is applied in a way that fosters enquiry and collaboration, it becomes a transformative experience for both students and adults. We're using technology to create possibilities in every classroom, for every child, every day," concluded Carbone.



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