

## **Math in Action**

### Maker Space Mindset

>> The entrepreneurial mind-set is important for a couple of reasons; number one, just practically. The International Data Corporation estimates that about 1.3 billion people are self-employed right now. So if you're working at, like, one in five people working for themselves, we need to provide students with the mind-set and the competencies to basically carve their own path, rather than waiting for a job that exists right now to just be ready for them. From a more sort of academic level, thinking like an entrepreneur is just basically what we would call inquiry-based learning. It's about asking interesting questions to solve problems. You're going to get much more engaged in the material that you're actually learning about. You're a manipulator of that information, rather than a consumer of that information. One of the biggest problems with school is that the finality of the way that school is organized. So I get to the end of an activity, I get my final grade on that. And then that's sort of -- that's done. I get to the end of the unit, I get to the end of the course, and there's this sense that I can now move on to something. I've actually had students tell me, it's, like, "Oh, I don't need to remember that anymore, because now we're on to something else." And we really need to get them out of that sort of mind-set that things happen in these segmented ways, because the way that the world works, and the way that innovation works is one, as I said, of iteration and building on previous knowledge. I think entrepreneurship provides a wonderful model to get students thinking in that manner.

>> When I think back, we talked for probably three years about getting rid of our old computer lab and making it into a different space. And I definitely had an idea in mind of a maker space. But we weren't ready. We weren't ready to give up the computer lab yet. But as practice changed, and we saw that how technology is being used, how you then support as an administrator by bringing in more mobile technology so that it can actually happen on the student's desk when the students need to have it, you know, we don't see the need to go to the computer lab. We don't go to a pencil lab, so we don't need to go to the computer lab. Those are things that you really can put in place to make sure the school is ready. So we were at a point last spring that we were ready. And we were ready to change the space, so that's what we decided to do. We had to really change the mind-set. We had to change to a real maker mentality. We talk about a maker mind-set, the idea that the inquiry has to be happening in the classroom. This space is the culmination of that. But without all of that, this space would just be another space. And really, the same practice could go on here. It's not the space that changed the practice. The practice had the change first.

>> Greg worked with this staff to transform the old library space, creating a centre for inquiry-based learning.

>> I think one is, it's really brought inquiry to a forefront. We actually do see it. I think there is value in even changing the frontage, the signage that we have going

into the space. It makes a very clear statement of what we believe in in a school. This is what we stand for. We stand for inquiry. We really encourage risk-taking. We want innovators here. And I think that that is so critical for the work that we're doing. And we try to do a lot of work with our parents to help them understand, what is twenty-first century learning? Why do we teach from the perspective that we teach from? So hosting twenty-first century learning nights, talking about, what are the needs of business? What are employers saying, that they are the needs? Really grounding it. Our parents are amazing. We have a large immigrant population that has come to Canada for one reason: They want the best for their kids. And it might look really different than their experience. But it's really grounded in good, strong research, and good, strong pedagogy. And we need to be clear with them of what that is.

>> Paula says the changing maker mind-set spread across the entire school, and into classrooms. She said it allowed teachers to feel encouraged and supported to take more risks in their practice.

>> The innovation lab, it's fantastic to visit and see, ah, so the kids are creating this. They're using the mathematical concepts in their science that they're building right now. So educators need to be open-minded and open to changing their ideas, changing their strategies, their techniques. And that was clear in our school, when the library was changed to the innovation lab. There was a different kind of activity that was taking place, that was observable. So I think even when you bring that to your classroom, if a new idea is experimented with by someone else and you receive that feedback, I think being open-minded to say, "I'd love to try that," that excites me as a teacher. It makes me feel like I have, you know, a new trick up my sleeve, so to speak. I have something that I feel really excited about that I would like to try. If you stagnate as a teacher, I really, truly believe your students are going to suffer. You need to be always changing. You need to be always open to new ideas. And once again, you need to bring that creativity to the learning environment. And you have to stand back, and you have to observe. And you have to be honest about what you observe.

>> Megan Linton works directly with students in the innovation lab, and helps them use new tools to find different ways of solving problems.

>> Student voice in this space makes everybody accountable for what's here. My schedule is constantly changing. There are different classes down here all the time. Work is around the room, it's set on display. There's works in progress. So it's been neat building that entire school community where there's respect and honouring of other ideas, and what's kind of on the move. Students know when they come down here that there could be a number of things on the go on the walls, so they know not to be touching those and respecting other students' learning. I really enjoy that students are accountable for their work, and they understand why they're here. It's not just, we have a set of checklist points that we need to reach. Yes, the curriculum is very important to kind of drive some of the process. But it's nice to know that

students are still getting out there in the real world, they're still connecting with current events that are happening, and then bringing that in the classroom and being excited about it. So sometimes, I'm with any idea. And that's why I always bring students back to that entrepreneurial thinking, or thinking of engineers, or designers in the real world. They test ideas all the time. And they don't work out. So it's being able to accept failure and moving on, and using that as a learning piece, and just flipping their mind-set. So it's okay to fail, but you're going to learn so much from that experience.

>> Creativity blossoms in the innovation lab as students are hands-on with new projects, and can openly share new ideas.

>> I think it is a very creative place. And again, I think it's very open about that, of talking about creativity as a skill that we need to encourage in students. So it's not something -- it's not a by-product, it is actually what we want. We want to encourage creativity. So again, encouraging risk-taking. I think you have to, as a leader, you have to be on top of things. You have to know what's going on out there, and you have to be one of the people that's going to help drive it. So whether it's looking towards a 3D printer -- I know I needed to know how to 3D print, because I need to be over there to support staff.

>> Creativity in the classroom, I think, is super valuable for student growth. I think it honours different levels of learning. I think me, for myself, I've learned that I'm a very creative person. And this space has allowed me to do so. So when I'm excited about what I'm doing and can do it at different levels, then my students are excited about doing it, and doing it in their way, because they're represented in this room. Not everybody learns the same way, I make that very clear to my students at the beginning of every year. We all learn differently, and we approach learning in different ways. So we kind of battle that piece right from the beginning. So we generate lots of ideas constantly. We use lots of different spaces kind of around the room, to make sure student thinking is evident. Even if an idea they're not comfortable with entirely, they know that, okay, I'm going to take a risk and throw it out there, anyways. And the community is created so that risk-taking is safe.