Maker. Space. Inquiry. Place. What might be the connection?

by Beth Lyons

There are many names and motivations behind exploring maker learning with students. The maker movement and its benefits for student learning has been an ongoing focus during our Library Learning Commons transformation at Larkspur Public School in the Peel District School Board (PDSB) over the past few years. In the 2017- 2018 school year, the staff at Larkspur Public School created a Maker Culture Professional Learning Network¹ (PLN) to see how we might implement curriculum focused maker learning to help both students and educators see the value of hands-on maker learning. We hoped they would see the maker movement as a way to learn about the process of their learning from an inquiry stance, to integrate 21st century competencies into their everyday work, and ignite a passion for making and creating.

Our first goal was to develop our understanding of the maker movement, to create maker opportunities to explore with our students and to share our learning with the staff in our school community. Our learning over the course of the year culminated with an opportunity to share our learning at a staff meeting. We created a carousel of maker stations related to one area of the curriculum for the staff to tinker, play, and explore with their grade level teams. Each activity had been conducted with a class of students prior to the staff meeting and had a picture book as an anchor text or provocation to spark the making. The stations were well received and many educators began to seek out time to co-plan and co-teach maker infused lessons in the library learning commons with the teacher-librarian.² The maker movement was also adopted as part of our Forest of Reading program in the 2017-2018 school year. Our program is run through the library learning commons in collaboration with classroom educators in Grades 1-3 and as a book club for students in Grade 4-5. Educators and students have the opportunity to explore responding to literature through maker opportunities and sharing their making with the school community. ³

As our understanding of the maker movement grew we began to adapt our goals to include providing students an opportunity to explore their own maker passions and maker inspiration outside of the curriculum. I am a firm believer in hands-on learning and the belief that students (and adults!) learn best through doing. In discussions with other teacher-librarians and through professional reading, I wanted to explore avenues to present students with opportunities to make for the sake of making, to make for the learning about making, and to make for the beauty of making.

¹ Follow this link to see the Maker Culture Theory of Action created by our committee- <u>http://bit.ly/MakerTheoryOfAction</u>

² Follow this link to see the slide deck created and shared as part of the Leadership Conference within the PDSB that highlighted our journey- <u>http://bit.ly/ShiftingMindset</u>

³ Follow this link to access the Google Site that is home to our maker infused Forest of Reading program each year-<u>http://bit.ly/TinkerInTheForest</u>

This led to the creation of the Genius Cart. The initial plan for the Genius Cart was that it would be part open making, part genius hour and part passion project. As our explorations and making got underway, it turned out that the Genius Cart would also be part inquiry-based learning as well. I choose to use a cart for this maker endeavor for a number of reasons. First, I wanted to be able to rotate the available materials and projects that students could interact with in order to implement some creative constraints. I wanted students to stretch towards new making opportunities instead of returning to recreate projects they had already explored. Secondly, we have a population of over 800 students at our school and by concentrating the maker materials on a cart I would be able to better manage the use of materials by students, the clean-up of the materials and replenish the materials as needed. Lastly, my administrator and I spoke about what might come after the Genius Cart and the successful (we hoped) implementation. The plan was to create a second cart that would be available for sign out by classrooms in order to continue our initial goal of creating a maker culture that spread beyond the walls of the library learning commons.

In order to measure or gauge the success of the Genius Cart I developed an *If - Then* statement as a method to promote ongoing reflection of the Genius Cart and the success (and failures) as I worked to develop the students' capacity to work in an open making atmosphere. Observations, photographs and anecdotal records were used to collect qualitative data on each challenge and the student's interactions with the making experience.

"If we provide a space for students to explore their maker and learning potential, **then** we will see students develop their maker mindset and ability to take creative risks."

The Genius Cart was launched by first presenting the idea to the staff at the school and providing time for educators to explore the cart and discuss how this maker opportunity might help to support the maker learning happening in their classrooms. (Lyons, B., 2018).

A few observations about this initial stage of the Genius Cart that ran from November 2018 to February 2019:⁴

- many educators were interested in bringing their entire class for an orientation activity involving a design thinking task
- a number of educators had planned ahead and booked the library space to integrate their ongoing maker activities with the Genius Cart (indicating that the maker culture was being adopted in our wider school community)
- many of the students who were coming during our scheduled open making periods did not come with a project in mind
- there was a lot of repeat making based on what had already been explored in class (e.g. building structures)

⁴ Ongoing observations, reflections, and photographs can be found on Twitter at either my personal Twitter-@MrsLyonsLibrary, the Larkspur LLC Twitter page- @LarkspurLibLC or by the hashtag- #LarkspurGeniusCart

- many, many, many students equate making with using a hot glue gun!
- students needed a lot of prompting to develop a plan prior to making, most wanted to jump in and "see where it goes"
- at times the making appeared "purposelessness"- students were not engaging with the materials in order to learn a "maker skill" or to create a product, but mainly to tinker with the materials.

Based on these observations, I decided that as we moved forward with the Genius Cart we would focus on exploring the intersection between inquiry, design thinking and the maker movement. If "an inquiry-based classroom is organized around the deliberate use of questions to stimulate learning", (Colyer, 2018, p. 2), then how might that be adapted for use in the library learning commons, and specifically for use with an open making program?

The focus of our inquiry-based Genius Cart would be:

If we approached our open-making program from an inquiry stance, would students begin to develop not only maker skills but an interest in learning and asking questions about making? Would students see making as a stepping stone to inquiry or inquiry as a stepping stone to making? What connections might be discovered between inquiry-based learning and the maker movement?

The following big ideas of inquiry from *THINQ 1-3: Inquiry-Based Learning in the Primary Classroom,* <u>(Colyer, 2018),</u> would be used to help guide the inquiry and the ongoing observations of students while they interacted with the Genius Cart:

- Inquiry results in students learning how to learn. (Colyer, 2018, p. 112)
- Teachers should be co-learners who model their wonder and thinking with students. (Colyer, 2018, p. 113)

To facilitate this exploration I created maker challenges based on different themes, (Fleming, 2017), that students could explore when they visited the Genius Cart. I felt that it was necessary to incorporate a variety of materials and challenges that focused on the process of making and not only the product.

John Spencer and A.J. Juliani (2017) describe seven stages of making that students work within as they encounter different making opportunities. As the students that visit the Genius Cart have a varying degree of experience learning from a inquiry-stance or with maker education it's important to keep these in mind in order to meet each student maker where they are on their journey and to ensure that the challenges, materials and provocations are allowing the students to stretch as learners and makers.

- Exposure (Passive Consuming)
- Active Consuming
- Critical Consuming

- Curating
- Copying and Modifying
- Mash-Ups
- Creating from Scratch (Spencer & Juliani, 2017, pp. 117-123)

To date we have explored the following challenges with the Genius Cart:

- A <u>"Zip Line" challenge</u> that was developed after consulting with another teacher-librarian who explored a similar design thinking challenge in her LLC. Students were invited to work their way through the Launch Cycle, (Spencer & Juliani, 2016), by examining photos and videos of zip lines and sharing their ideas and questions on an inquiry chart. Students created plans and materials lists for their carrier designs and then we built, tested and shared our success. I documented the process, student observations and discussions as we worked through the iterations of their designs and testing on the zipline. Based on this Genius Cart challenge I wondered how we might provide students help students to undertake the process of documenting their own learning for the purpose of reflection? There was a lot of natural reflection happening that led to re-designing and re-building, but few students returned to their original plans to document these changes as they happened. How might we help students to understand the importance of documenting the reflection inherent in their making endeavors?
- Allowing students time to tinker and explore new building and STEM materials, such as K'Nex, Lego, Straws and Connectors, natural building materials and Keva Planks. Observing the students as they explored these materials in an open-ended fashion provided interesting insights into how students cope with failure and problem-solving in their making. K'Nex was a new material for many students and provided a great deal of frustration for some. Rather than work through their problems many of the students chose to abandon this material for a more well-known material such as Lego. I wondered how often educators are offering time to students to explore, tinker and gain familiarity with a new material before beginning a maker endeavor? How do we promote a growth mindset with students in regards to new materials while still allowing space for voice and choice?
- Providing time for students to explore art created by others and to express themselves through art is an important facet of the maker movement, in my opinion. I wanted to use the Genius Cart to explore paper sculptures and paper mosaics with the students. I felt that the sculptures would provide a bridge to new making for those students who had previously explored building structures in their class and had worked to recreate that making when visiting the Genius Cart and the Library Learning Commons. By choosing mosaics I wanted students to have an opportunity to slow down while making and creating. Often students have an idea and rush to try it out, only to discover they need to re-build, re-create or start over. Mosaics require planning and forethought prior to starting. It was interesting to observe that most of the students chose to create sculptures. As I talked with the students it seemed like many of them had difficulty visualizing how they might create a picture using a mosaic and were drawn to creating a paper sculpture. It may have been the opportunity to use a hot glue gun or the more

abstract nature of the paper sculptures. I wonder how we might encourage students to attempt making that requires more forethought and planning?

As students begin to develop their maker skills it's important that they begin to see making as a means to problem-solving and connecting with others in their local community and beyond. At PDSB we recognize and learn about a set of character traits throughout the course of the school year and in the autumn of 2019 our school was learning more about being inclusive. This led to the creation of a Genius Cart challenge, (Lyons, E. 2019), that incorporated loose parts and the Global Goals for Sustainable Development (2015). Students were asked to design and build the "perfect playground" using loose parts. The creative constraint that was added by using loose parts meant students needed to observe and reflect on the materials available and how they might be used to create the playground they imagined. As an extra challenge and call for reflection, I asked the student makers to pause part way through their building to consider if a child with a disability came to their playground would they be able to play and interact as well as the other children on the playground? What is the child was blind? What if the child had movement issues, like a wheelchair or crutches? What if the child had balance issues? All of the student makers embraced these prompts and immediately began redesign their playgrounds to incorporate a more inclusive layout. One difference with this challenge compared to the others is that all the students chose to work in pairs or small groups, even when given the chance to work alone and all of the students constantly verbalized their thoughts as they built and rebuilt their playground. I wonder if it was the challenge itself or the material being loose parts that encouraged increased collaboration and discussion while making? I wonder if the discussions involving inclusion that were happening in their classrooms were prompting this change? How might we continue to challenge students as makers and help them to see the value in collaboration and discussion about their process when using other maker materials?

What does the future hold for continued open-making in the Larkspur Library Learning Commons? How might the Genius Cart be further adapted to encourage more educators to explore maker opportunities with their students? How might we get students involved with the planning and preparing of challenges for the Genius Cart?

As I continue to plan and refine the Genius Cart initiative and reflect on the maker culture within my school community, I am proud of the progress we have made and the steps we have taken. The students that frequently visit the Genius Cart are excited and focused on their making. They are open to taking risks with their learning and challenging themselves to learn new skills and information. I feel that it is essential for educators to embrace this learning opportunity with their classes, either through full class visits to the Genius Cart or allowing their students to visit during our open making times. Providing open making experiences for students opens up a world of new learning for educators about their students and their abilities. All students can become passionate problem-solvers and leaders when engaged in making. Students learn the importance of failing forward, of starting over, and asking for help. Students may bring a host of maker skills the teacher did not know about previously. I'd like to incorporate student-driven documentation, either through photographs or videos

of students reflecting on their making but as with many things in education time is a hindering factor. How might students be encouraged to pause in their making to record their reflections to foster greater learning from themselves and for others?

The challenge of finding, creating, adapting challenges for the Genius Cart every few months has become one of my favourite parts of this endeavor. Looking for materials and provocations that might capture the imagination of the students, balancing challenges that focus on the process of making with challenges that create a product, and finding ways to model my own wonder and thinking as it relates to making has been a wonderful learning journey on it's own. As I reflected in a blog post last year, "So far the biggest takeaway from teaching and learning from an inquiry stance is that it involves playing the long game. That is, the rewards come down the road and you have to be willing to be an active participant in achieving the goals necessary for student success (e.g., 21st Century Competencies) which will take some time and some effort. Ensuring our students are prepared and able to be active participants in their society and to tackle the problems of our world is a long game. It's going to take some time. It's not a "one and done" proposition. One can't "do inquiry" and then move on, that's just not how it works. If we expect our students to exhibit a growth mindset, to reiterate when they are solving problems, to be reflective and communicate about their struggles with achieving their goals, then we must also do these things" (Lyons, B., 2019, April 14). Continuing to reflect, refine, adapt and modify my own learning about the maker movement and inquiry-based learning will only benefit the students as they come to make and create with the Genius Cart.

Some parts of this paper originally appeared on the author's blog.

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