

**Making it Work: A Learning Commons Approach to Engaging Middle School**

**Students' Interest and Inquiry in the Curriculum**

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## 2 Learning Commons Approach to Engagement

Many traditional middle school classrooms - grades six through eight - are no longer engaging students or getting them excited to learn. Surveys show that intellectual engagement in Canadian schools decreases in the middle school years. Lack of engagement in school begins in earnest in grade six and only further increases for students in grades seven and eight (CEA, 2011).

Why is this? One reason for this could be that students are often not applying skills in class that are relevant to their everyday lives. A missing link currently exists between the skills many of our students use at home in digital and online environments compared to those used at school. Another reason for lack of engagement in class could be that students do not have opportunities to pursue topics of personal interest for research and inquiry.

New Ontario curriculum documents emphasize the need for students to learn through a twenty first century lens (Ontario Ministry of Education, 2013). In order to be successful in today's world, it is essential that students be provided with more opportunities to learn through inquiry, problem solving and collaboration in digital and physical environments. While these opportunities may be present in classrooms for curricular inquiry projects - opportunities to explore personal interests are often not.

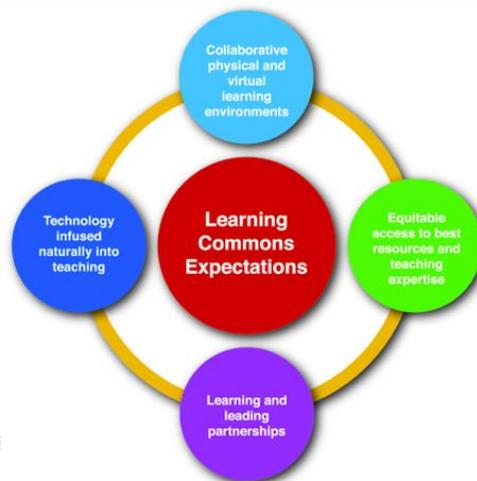
How then, can we leverage what interests and engages student inquiry outside school to what happens inside our classrooms? How do we build skills through relevant instruction and assessment that will prepare students for success in the twenty first century? How do we bridge the gap between home and school to increase student engagement and interest in the curriculum?

### Makerspaces and the Library Learning Commons

It is clear that schools need to reclaim their position as a place where learners can actively pursue their interests and passions for inquiry, exploration and discovery.

The school library learning commons is one such space that can play an instrumental role fuelling and fostering both new and current learning experiences for all learners. Indeed, the learning commons space is a place where instruction, resources, and the learning environment have been carefully designed (Ontario Library Association, 2010). Learning opportunities are orchestrated to suit the particular interests, needs, and stage of readiness of all of our learners - students and staff - and to meet them wherever they may be.

*Figure 1: Expectations of the library learning commons space.<sup>1</sup>*



<sup>1</sup> Retrieved from <http://www.talcoontario.ca/digital-citizenship/about-this-project/ont>

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Indeed, one of the core aims in the new library learning commons space is a focus on digital literacy and a constructivist approach to learning, facilitated through inquiry and collaboration. It is a fact that library learning commons spaces are continuing to redefine and reinvent themselves to support inquiry and collaborative design through the creation of “makerspaces”, “fab labs” or “hackerspaces” (Henning, 2012).

Makerspaces encourage hands on innovation, creation, invention and design in shared environments using a mix of digital and nondigital tools. These spaces offer their patrons opportunities to actively “envision, create, innovate, play, formatively learn, experiment, collaborate, share and most of all, dream of possibilities” (Gorman, 2014). Undeniably, it is through the collaboration and sharing of knowledge around a range of activities that a commitment to inquiry and creation is built (Peppler & Bender, 2013). Once only stand alone operations for adult learners, makerspaces are a perfect fit for school library learning commons spaces as well.

Documented case studies (Fleming, Kurti, & Kurt, 2014; Kurti, 2015; Smay & Walker, 2015) on effective library learning commons makerspaces share common attributes:

- they hold the belief that every student has the ability to create and innovate
- they encourage learning partnerships and student directed learning
- they prepare students to be producers, not consumers of knowledge
- they have a mix of digital and nondigital tools that range from easy to challenging for their target audience
- informal learning experiences are designed to meet student needs/aspirations while loosely aligning to curricular standards<sup>2</sup>

Furthermore, leading experts on makerspaces in learning commons spaces indicate that learning commons makerspaces do not need to be constricted to a physical environment. In fact, in addition to the physical space a school affords its students, learning commons spaces should scaffold and support learning by layering a virtual makerspace environment (Loertscher, 2015).

#### **A Makerspace Intervention**

One of the most exciting developments for the middle school learning commons at The Valleys Senior Public School this year will be the creation of a makerspace so personal inquiry, ideas and passions can spring to life. Our makerspace will feature a mix of digital and nondigital tools to foster student inquiry, exploration and sharing of innovation. The physical space will be further supported and complemented with a collaborative and interactive virtual makerspace environment (a makerspace wiki).

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<sup>2</sup> Loertscher (2015) suggests learning be kept informal in this space. Connecting formal with informal learning may serve to quell the spirit of the latter.

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A virtual makerspace can serve many purposes. Firstly, it can help differentiate content and provide additional support for learners. Secondly, it serves a platform for all future making as it allows access to innovation, and sharing on any web enabled device in and outside school hours.

The creation of a makerspace for learners and more specifically the implementation of a virtual “makerspace” wiki is soundly underpinned by several key pedagogical learning, information and communication technology theories.

The very nature of a wiki follows a constructivist paradigm, as it is “a website or database developed collaboratively by a community of users, allowing any user to add and edit content” (Oxford University Press, 2015). Inspired by Bruner’s Constructivist Learning Theory (1960), and Vygotsky’s Social Development Theory (1962), this wiki will allow students to actively and physically construct knowledge in a socially structured digital setting. The use of wiki technology will allow students to simultaneously collaborate; adding, questioning, dialoguing and editing content to fit their personal needs. Using a student-centred approach, this wiki will be learner driven; its aim to bridge the gap between what students can do independently and what they can accomplish with assistance. By using the differentiated resources provided in this particular wiki, every child will be encouraged to work in their own zone of proximal development.

The makerspace wiki will also be designed in accordance with Sweller’s Cognitive Load Theory (1988), to reduce the cognitive load of learners. The wiki will give students one place where resources can be accessed and shared quickly with ease. Indeed, studies of student wiki use have shown that when a wiki is simply designed, learners are able to find, share and create resources for and with each other easier (Nicolson et al, 2005).

The Task Technology Fit Theory states that the specific use of technology for a distinct purpose can raise an individual’s performance (Goodhue & Thompson, 1995). Several elements of this theory (locatability, quality, ease of use, compatibility, authorization, relationship with users) certainly correlate with the theories mentioned above. The use of this wiki - technology as a tool - for learning clearly supports and facilitates student learning, inquiry, collaboration and discovery in the makerspace environment.

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Table 1:

TTF Theory Element	How the wiki (as a tool) supports learning:	Correlating theories
<b>Locatability</b> (inquiry challenges are easy to find and understand)	<ul style="list-style-type: none"> <li>- site layout will be designed to easily navigate students to their area of inquiry and interest</li> <li>- different pages will be created for various inquiry challenges to facilitate exploration and discovery</li> <li>- information posted on specific pages of the wiki will be detailed, interactive and visual in nature to aid comprehension and encourage hands on learning</li> </ul>	<ul style="list-style-type: none"> <li>- Cognitive Load Theory</li> </ul>
<b>Quality</b> (level of detail required for users)	<ul style="list-style-type: none"> <li>- information and resources posted on wiki will be detailed, visual and interactive in nature to aid discovery and exploration</li> <li>- students will all have access to view/edit/add and collaborate to ensure content fits their particular needs</li> <li>- resources/challenges will range in task complexity to build learning skills</li> </ul>	<ul style="list-style-type: none"> <li>- Cognitive Load Theory</li> <li>- Constructivist Learning Theory</li> <li>- Social Development Theory</li> </ul>
<b>Compatibility</b> (how the wiki matches the needs of the students)	<ul style="list-style-type: none"> <li>- resources posted will augment student identified interests</li> <li>- students will all have access to view/edit/add and collaborate to ensure content fits their particular needs</li> <li>- resources/challenges will range in task complexity to suit different learning needs/ skills</li> </ul>	<ul style="list-style-type: none"> <li>- Constructivist Learning Theory</li> <li>- Social Development Theory</li> </ul>
<b>Authorization</b> (ability for students to access and contribute to the wiki)	<ul style="list-style-type: none"> <li>- site will be created on Google sites and shared with students through board Gmail accounts - allowing access to students in and outside school hours</li> <li>- students will all have access to view/edit/add and collaborate to ensure content fits their particular needs</li> </ul>	<ul style="list-style-type: none"> <li>- Cognitive Load Theory</li> <li>- Constructivist Learning Theory</li> <li>- Social Development Theory</li> </ul>
<b>Ease of Use</b>	<ul style="list-style-type: none"> <li>- wiki use will be modelled for students at the first meeting of physical makerspace</li> <li>- tutorials how to add/edit wiki will be posted on the wiki for future reference</li> </ul>	<ul style="list-style-type: none"> <li>- Cognitive Load Theory</li> <li>- Social Development Theory</li> </ul>
<b>Relationship with Users</b> (how wiki builds interest, dedication and responsiveness in students)	<ul style="list-style-type: none"> <li>- as students construct this site together, relationships and collaboration towards a common goal will be built</li> <li>- students will have opportunities to self direct their inquiry interests using resources posted</li> <li>- students will all have access to view/edit/add and collaborate to ensure content fits their learning needs</li> </ul>	<ul style="list-style-type: none"> <li>- Cognitive Load Theory</li> <li>- Constructivist Learning Theory</li> </ul>

Studies have proven the benefit of using wikis to build and support communities of innovation and learning. Wikis have been shown to have a high fit in supporting development of new products because their collaborative features (Kruse, 2014). Wikis can help support complicated tasks; access to the resources posted on wikis can help reinforce inquiries that require multiple steps in one's working memory (Gupta, 2014). Findings also show that when information in a wiki is presented in an interactive and visual environment, interest and satisfaction in learning is increased (Nicholson et al, 2008). Finally, if students are actively involved in the collaboration and construction of a virtual learning resource (i.e. makerspace wiki), they will use it (Loertscher, 2015).

### The Makerspace Design Process

Laura Fleming - a library media specialist in New Jersey, outlines the process that schools should take when implementing a makerspace.

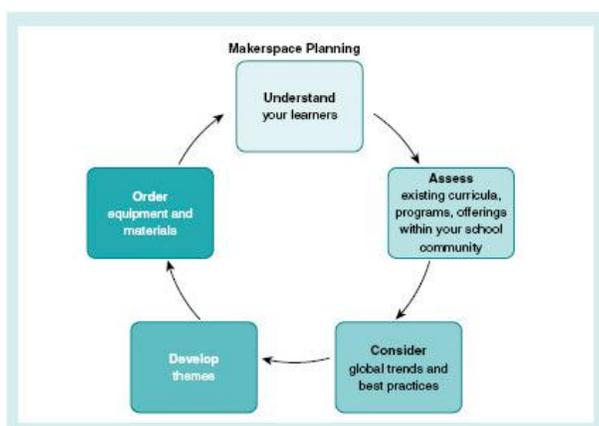


Figure 2. Laura Fleming's process for planning a makerspace.<sup>3</sup>

This process will be modified by the teachers and students at The Valleys Snr Public School. In particular, we will be taking into consideration the implementation of a virtual space (a makerspace wiki) to support and complement the physical makerspace environment.

### Key Implementation Steps for The Valleys Senior Public School

1. Understand our learners
  - a. We will create a Google Forms survey to help identify student aspirations, needs, interests and existing skill sets.
  - b. Survey will be shared with students and delivered through board generated Gmail accounts.
  - c. Data will be collected and curated.
  - d. Teachers will continue to dialogue informally with students and each other to develop learning profiles/needs/interests of all learners.

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<sup>3</sup> Courtesy of Laura Fleming in *Worlds of Making*

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2. Assess
  - a. We will look at existing curriculum for students in grade six, seven and eight to see where expectations can be loosely aligned to meet student interests.
  - b. We will assess what tools or opportunities are currently available in our school and local community.
3. Consider
  - a. We will research best practices when creating learning experiences in physical and virtual makerspaces. We will consider the best platforms for developing our virtual space and how to make it easily accessible to our learners.
  - b. We will consider tools and learning experiences that best suit the needs, skills, interests and readiness of our students and staff. We will aim to begin small and build readiness as needed.
  - c. We will consider what is a sustainable and affordable plan for our school.
4. Develop
  - a. We will develop learning experiences and resources through creation of a virtual environment. Google Sites is a platform that has the ability to act as a wiki when students are granted editing rights. This platform is also easily accessible to students through their board generated Gmail accounts.
5. Order and Implement
  - a. We will order resources needed for inquiry.
  - b. We will invite students and staff to wiki, model use of wiki and allow learners to begin exploration of virtual resources to decide direction of inquiry in both our virtual and physical spaces.
6. Modify
  - a. We will modify learning experiences and wiki with students as needed to support learning, inquiry and interests.
7. Extend
  - a. Continue to garner a school wide interest in making. Provide opportunities for students to showcase their learning through social media, school assemblies and school maker fairs.
  - b. Develop with staff how interests in this informal space can lead to relevant instruction and assessment in classrooms.
  - c. Encourage students to continue to add to the wiki and ultimately, the global environment by creating and sharing video tutorials to explain and teach how they accomplished innovative designs.
8. Repeat steps 1-7.

### **Expected Outcomes**

It is expected that students will crave making in this space and will jump at the opportunity to participate in this novel form of inquiry for personal interest and learning. We will be challenged and excited by our students' interests and will at times, feel overwhelmed by the possibilities. We will need to be innovative in the attempt to meet the learning needs of our students. Given our school has a limited budget we are going to have to think creatively and critically about what tools meet the readiness of our school. We will need to consider an item's full educational potential, curricular application and impact on learners before making a significant financial commitment.

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Other options to expose students to various technologies will need to be sought; partnerships with our local high school and public library are two such possible resources available to pursue.

It is anticipated that building a community of learners who regularly contribute to a wiki will take time. While students may be excited and engaged in the physical making opportunities - the actual contribution to the makerspace wiki may be another story. Students will need to see the wiki as a community where all makers have an equal responsibility to add to the learning of others. Teachers are no longer the “sage on the stage”, but rather the “guide on the side” in these new learning partnerships (Prensky, 2008). Modelling, scaffolding and opportunities to add to the wiki in school hours will be needed in order for this new process of sharing and collaboration to become effortless and routine.

### **Expected Outcomes with Relevance to Classroom Instruction and Assessment**

Our makerspace will turn school back into a place where learners can actively pursue their interests and passions for inquiry, exploration and discovery. Students and teachers will collaborate with each other to develop skills no one knew they had - including themselves! New knowledge and excitement for learning will be built.

As students complete inquiry challenges, they will make connections and will ponder how they can apply what they have created to showcase learning done in the classroom. Curricular applications will blossom. Teachers and students will see additional opportunities to use learning done in the makerspace to drive instruction and assessment in their classrooms. Collaborative partnerships will continue to form between students and teachers to make relevant and meaningful connections to the curriculum being taught.

As the gap between skills students use at home to those used at school decreases, student engagement will increase. Students and their teachers will learn for and from each other as they dialogue, collaborate and problem solve inquiry and design challenges.

Through the implementation of a school learning commons makerspace, students will be engaged and excited to learn in school once more. They will be prepared for a future in the twenty first century because they will be actively pursuing their interests, using, applying and developing the skills that are meaningful and relevant to their everyday lives.

### **The Story Thus Far**

Our makerspace has been in full operation since September 2015 and will always be a work in progress.

As predicted, students have flocked to the library for all types of making with new activities being added monthly based on student interest. Meeting all the requests of our students is sometimes difficult as the learning commons operates under a fixed budget -

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creative thinking has been required. Establishing partnerships with our local high school and public libraries has been key to providing our students with many new opportunities.

Currently our space offers:

- coding and game making via Scratch and Roblox
- animation via Flash
- LEGO and other construction tools
- green screen room
- beading, knitting, sewing, crocheting (e-textiles coming soon)
- squishy circuits and Sphero robots
- 3D printing being explored via partnerships with our local high school and public library

While students are extremely engaged in the physical environment, sustained and regular attendance for some of our students has proven to be difficult. Exploring how our virtual space can assist inquiry and exploration beyond school hours and the physical space is our next course of action.

The virtual space too, is a work in progress and is not regularly updated by our learners. In the new year we plan to re-visit this space with students to review how we can best encourage regular contribution and sharing. Part of the problem may be in the design of the wiki itself. Some of the themed pages in the wiki encourage students to complete “challenges” and these challenges are not student driven. In a recent tweet, Laura Fleming emphasized that makerspaces should not “box students in with challenges” and that “open exploration” is key. Perhaps having students define goals for learning in this space will encourage a greater commitment to sharing and a vested interest in continued learning.

The informal learning being done in this space is being shared around the school. Students are sharing their learning with others and bringing more interest to the making environment. Teachers are actively looking to partner in the learning commons to learn how making can foster interest, inquiry and exploration in the classroom.

We plan to host our very own “maker fair” to display the skills of our students during Education Week - April 2016 - and will continue to look for ways we can share our learning not only at our school, but also in the community, province, country and world.

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