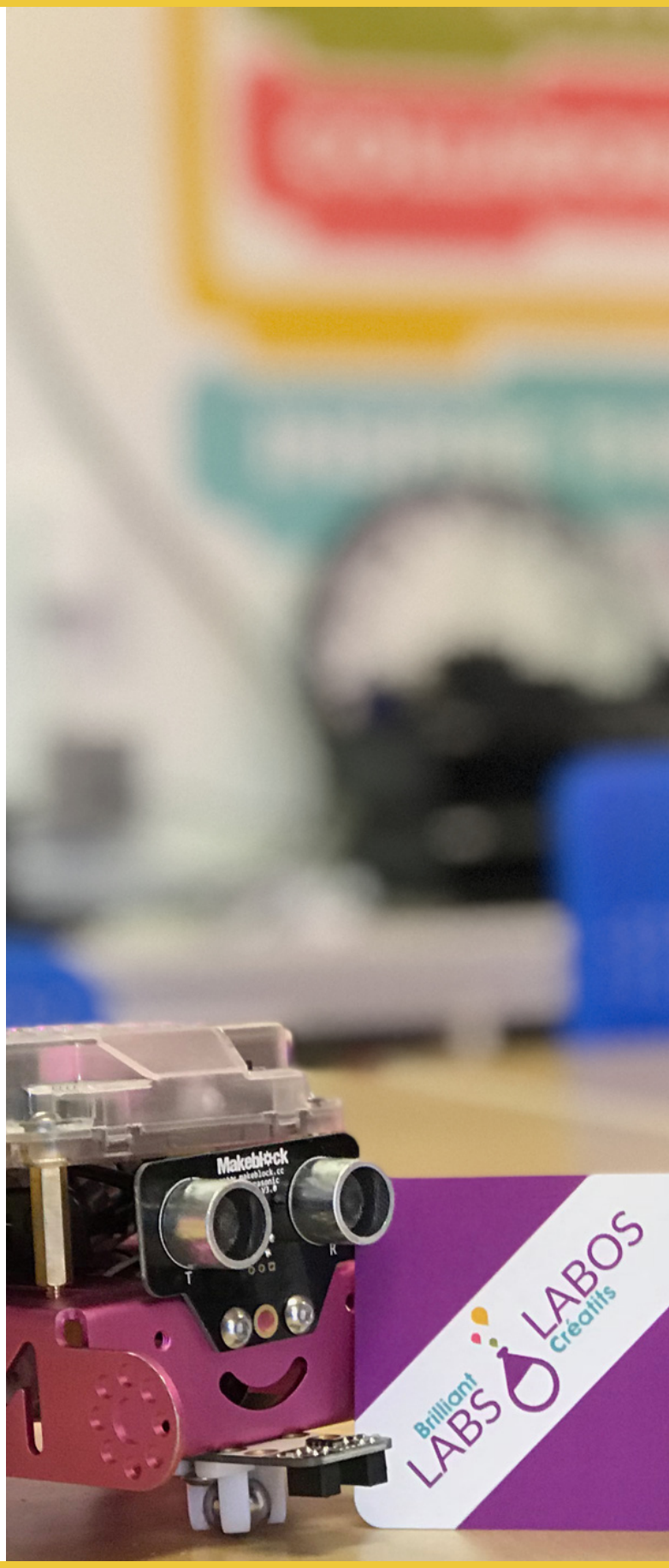
Brilliant LABS LABOS Créatifs

HOW TO START A MAKERSPACE

A QUICK AND EASY GUIDE TO START MAKING SPACE FOR MAKING

A WORKING DOCUMENT (V.0.1).



ABOUT THIS GUIDE

This guide presents an overview of how to set up a makerspace and provide youth with maker-centred learning experiences.

We provide suggestions on starting and maintaining a youth-led makerspace and highlight some specific attributes of makerspaces, including space, materials, activities, safety considerations, support, and sustainability.

We hope this guide will help you plan and nurture your makerspace and explore the positive impacts of building knowledge through maker-centred learning.

Additional resources are embedded as links within the document and at the end for those wanting to take a deeper dive. Please keep in mind that makerspaces should be in a state of constant flux.

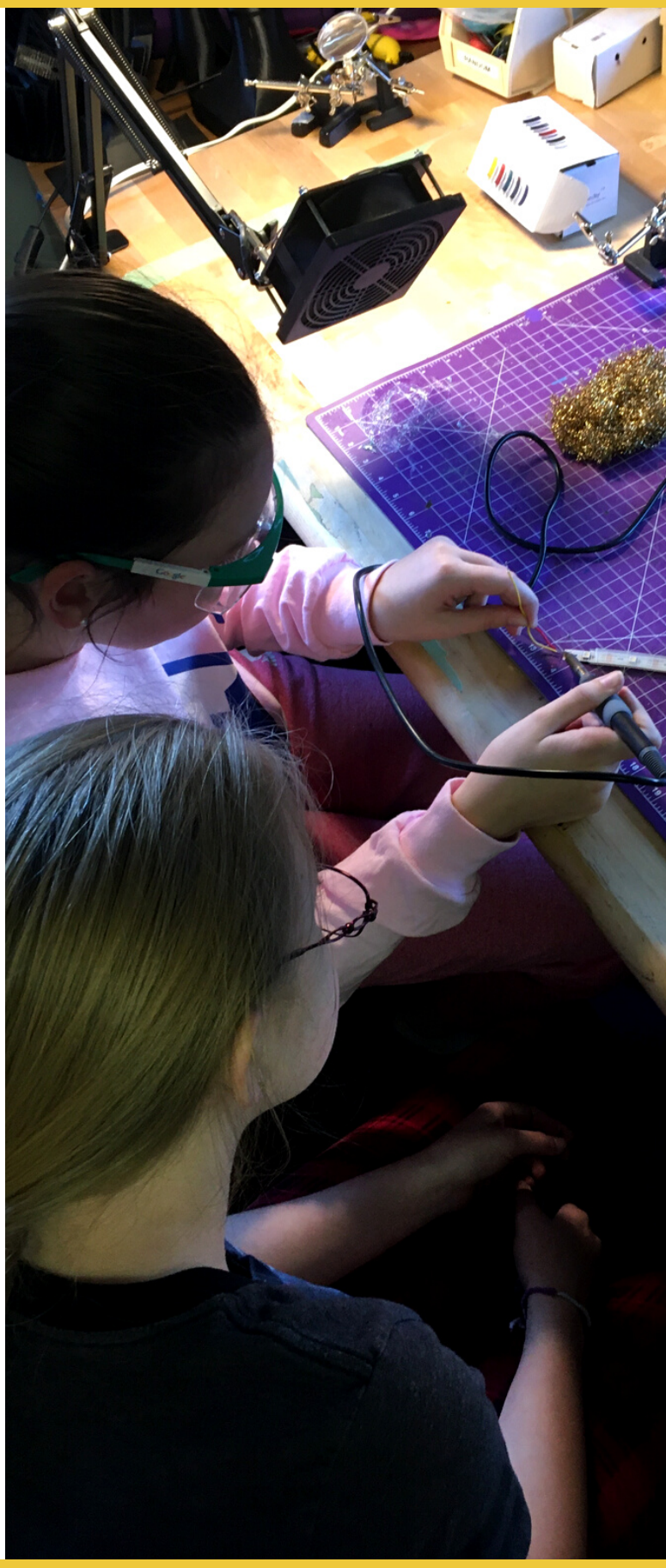
Innovation, creativity, and technology continually advance, and evolve and so too should your makerspace!

MAKER-CENTRED LEARNING

Maker-centred learning is an interdisciplinary approach where young people are engaged in creating meaningful hands-on, minds-on and hearts-on projects in an environment that provides creative freedom. It also offers safety and comfort with materials and technologies that are accessible and allows them to explore new ideas and stretch their thinking. This process is led by an enthusiastic facilitator utilizing a design process to foster creative learning. Maker-centred learning is nuanced, builds on various approaches, constantly evolves and is highly contextual. As you start your own maker-centred journey and process, you will discover your own meaning, purpose and personalized definition that encompasses this multi-faceted approach. *In this document, we refer to young people (ages 5-18 yrs old) engaged in maker-centred learning experiences as ‘makers.’

WHAT IS A MAKERSPACE?

A makerspace is a creative and collaborative environment that enables makers and facilitators to explore new ideas, tinker with materials and technologies, and design projects that they care about. In the process, they learn new concepts, skills, and perspectives, making connections to bigger ideas and purposes for themselves and the communities around them. It’s also a great place to prototype innovative solutions to real-world problems or develop certain components of socially responsible endeavours.



VALUE OF MAKERSPACES AND MAKER-CENTRED LEARNING

Makers are engaged in the learning process while contributing positively to society. They will learn new skills in culturally significant contexts. They will be inspired to take charge and bring a change in their own lives and to the lives of others. In makerspaces, young people as makers work on innovative projects that allow them to fail, iterate, redesign and enhance their learning, and try again. Through this process, they build resilience and creative confidence. This open-ended learning process of making mistakes, exploring with materials and working on projects in collaboration with others is slow but ensures deeper learning. It also provides an approach to build and manage new knowledge creatively in a way that makers can apply what they learn in their lives.

Makerspaces provide autonomy and empowerment to ask questions, take the initiative, own their learning, and make a difference. This fluid process fosters curiosity and enthusiasm, offering multiple pathways of learning. Within this setting, a culture of making and a peer-led community of makers and problem solvers develops. This can support the socio-emotional well-being of the participating makers, help them develop new skills and competencies, and encourage them to apply their energy and creativity in socially responsible ways.

MAKERSPACES PROVIDE AUTONOMY AND EMPOWERMENT TO ASK QUESTIONS, TAKE THE INITIATIVE, OWN THEIR LEARNING, AND MAKE A DIFFERENCE.

MAKERSPACES

Traditionally, the idea of creative spaces has always existed where makers come up with new ideas and design projects with their hands using tools and materials, but they weren't explicitly called 'makerspaces'. The rise of the global 'Maker movement' popularized the term and has led to a growing number of makerspaces in schools and informal learning environments like libraries, museums and youth centres. Now makerspaces are hubs of self-directed learning where makers create innovative and meaningful projects using emerging technologies. Maker-centred learning is also becoming part of mainstream education, in which schools are defining new educator roles such as Maker teachers, makerspace managers and STEAM specialists.

Makerspaces come in many shapes, sizes, and can also serve different audiences and purposes. When it comes to shape and form, there are many approaches and styles depending on the needs and budget. For some, a makerspace looks like a box, a movable cart or a case that you can take anywhere and deploy for use, while for others it's a large or small physical space where youth can enter and create, some are highly mobile experiences that visit different areas such as pop-up or mobile makerspaces.

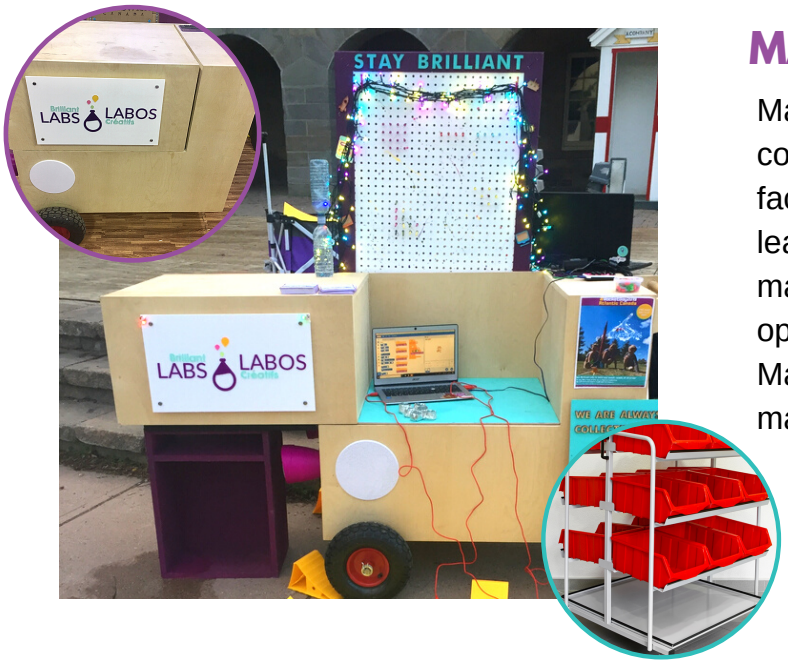
Sometimes facilitators can bring the maker mindset, creative attitude and entrepreneurial spirit to makers when they are at home, encouraging them to build something they care about using everyday materials. Whatever form it may be, your makerspace reflects your community's culture, interests, and values.

HERE ARE SOME WAYS YOU CAN CREATE MAKERSPACES:

Some elements from each of these can be combined to create a holistic maker-centred learning experience where space is customized for its makers.

A DISTINCT PHYSICAL SPACE

Makerspaces can take on many sizes, shapes, and functionality. One common approach is a large physical space. Similar to a community room, science lab, art spaces or tech rooms, makers go to the makerspace and have access to materials and tools for designing and developing projects. Such distinct spaces can play a significant role in fostering creative learning where space itself becomes inspiring and a learning catalyst, adding to the facilitators and peers.



MAKERCARTS

Makercarts are mobile carts with tools, electronics, computational and building materials allowing facilitators to expose makers to a comprehensive learning experience through making. Rather than makers going to separate spaces, learning opportunities come to them through makercarts. Makercarts can cater to specific needs and themes but may not necessarily have a huge range of materials.

MAKER CORNERS

Just like arts and craft supplies, you can stock and organize maker materials in any space. Depending on their needs, makers can access the materials anytime. Some also repurpose a former storage space or breakout rooms to create these spaces. Maker corners provide frequent opportunities to integrate maker-centred learning in everyday experiences.

MAKER KITS

Uniquely designed for specific activities, maker kits come in various forms as envelopes, backpacks, buckets, bins, etc. Maker kits are activity-based portable sets that provide easier access to materials needed from anywhere. Sometimes they include creative prompts that encourage makers to see the world as their construction kit and gather materials from what's around them. Maker-kits are great for outdoor and remote learning experiences and can be designed to answer most needs.

NATURAL MAKING

Relatively new in Canada and introduced by Brilliant Labs, Natural Making allows for a connection with the world outside. Natural Makerspaces have no walls and promote using natural materials and phenomena to manipulate, explore, discover, and create. Everything you need can be found in and around the neighbourhood. Technology can be used in many ways, such as creating soundscapes capturing nature, making earth orchestras using Makey Makey microcontrollers, and using soil, water, and weather sensors to connect and understand nature.

BIO MAKING

Bio Making is an emerging idea of makerspaces where makers explore biological systems in nature and design projects by collaborating with harmless microbes like fungi, bacteria, yeast, and algae.

Biomaking encourages innovation for a sustainable future where makers employ:

Biomimicry: a process in which they design projects inspired by nature

Biocollaboration: where they seek help from living creatures and systems to design something

Biofabrication: where they invent new bio-derived and biodegradable materials and products.

TRADITIONAL SPACES

Many organizations include spaces for vocational training that can potentially allow creativity and making. These include spaces such as a woodshop, a community garden, a library, a museum breakout room, a science lab, an art studio, and a music studio.

STARTING A MAKERSPACE

THE FOLLOWING ARE SUGGESTED STEPS THAT CAN HELP YOU START A MAKERSPACE.

ASSESSING INTERESTS AND NEEDS

Making is a learner-centred process that focuses on individual, collaborative, and community passions and interests. As you plan towards designing your makerspaces, think about who will be involved. Explore topics and areas that inspire everyone in your community. Also, take a moment to reflect on what is currently happening at your school or in your community and what can be added to enhance learning experiences through making. Perhaps there are already project based learning activities. It's good to create a list of things that are already happening that can be used to leverage other maker-centred activities. Once you have a sense of what currently exists, you can figure out what is missing and needs to be ordered or what can be repurposed. It is important to remember that makerspaces should be designed with the makers and projects in mind as they are more important than space itself and its materials.

REPURPOSING SPACE

Before you start, find what is already there. Is there an under-utilized space that can be transformed into a makerspace? With just a few modifications, you will be surprised that people have transformed spaces like an old math breakout room, a storage room, a garage, a trailer, a backyard shed, a library sewing room, or an unused chemistry lab into fantastic makerspaces. There are also instances of pop-up makerspaces where people have used tents or other temporary set-ups as maker stations in public gardens or community events. Similarly, you can repurpose existing tools and machines that are not being used.

CREATING A PLAN

Your plan should include space, activities, materials, logistics, safety, and sustainability considerations. As you create a plan, be explicit in stating:

- Who will be using this space?
- What type of projects may be of interest?
- How can this makerspace enhance the learning experience?

- What type of activities align with makers' interests and passions?
- What types of materials and technologies do you need?

- What type of infrastructure is needed?
- Do you need access to electricity, water, internet, ventilation, customized stations, storage, work surfaces, etc.?

- What form would be more suitable, a big space, a maker corner or portable makercarts or kits?
- Will the space allow makers to test some of their prototypes?

- Where do you see maker-centred learning, indoors, outdoors or a blend of both?
- How will you ensure maker safety? What preventable events might occur?

- Where can the ongoing projects be stored and displayed?
- How might you 'showcase' works and encourage makers to discuss them?

As you plan your makerspace design, please consider the balance of storage and open spaces. Makers need tools and materials, but they also need comfortable building space to plan and design projects. In addition, there should be extra space for makers to walk around and access materials safely to avoid hazards such as tripping, spills or electrical/fire incidents.

IDENTIFY AND ENGAGE PARTNERS AND SUPPORTERS

Developing and sustaining a makerspace is a very large endeavour and requires support from as many people as possible.

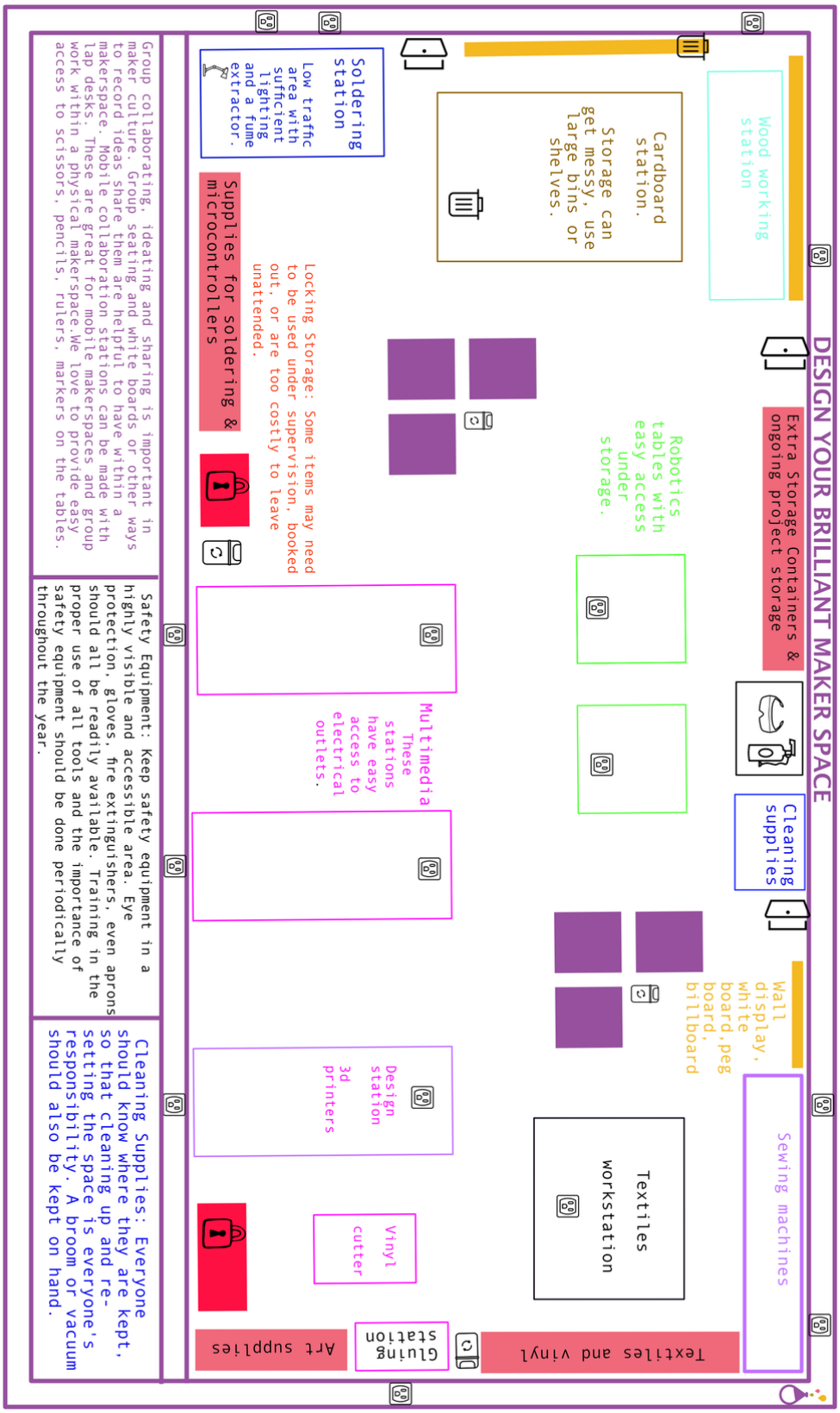
Partners can play a key role in securing funding, volunteers, donations, or expertise and where makerspaces are perfect for collaborating on projects, they also require collaboration to implement and sustain over time.

Community and Private Sector partners are important regardless of whether or not the space is limited to school use only, or if it is also made available to community members after hours.

- **What NGOs or Companies in your area can offer support?**
- **Do you need material, financial, or human resource support?**
- **Consider small specific requests related to NGO or Company mandates and goals rather than large generic requests for support.**
- **Does a nearby company have an Employer Supported Volunteerism Program where you can recruit volunteer expertise to support the makerspace and some of its projects?**

- **Would a local community or interest group be able to benefit from the makerspace, and what could they contribute in exchange for using the space?**
- **How will engagement and materials be sustained over time? How will you be able to replenish consumable materials used daily by makers?**
- **Is there expertise in the community on certain equipment that you may want in your makerspace so those experts can take care of orientation and training at certain stations?**

HERE IS AN EXAMPLE BASED ON A LARGE MAKERSPACE



DESIGN YOUR BRILLIANT MAKER SPACE

PLAN YOUR OWN MAKER SPACE IN ORDER TO #MAKESOMETHINGBRILLIANT

STATIONS

SOLDERING ELECTRONICS & PROTOTYPING
WOOD WORKING
TEXTILES
FINISHING MATERIALS
CONCEPTION & PLANNING
CONCEPTION & 3D PRINTING
MULTI-MEDIA
CONSTRUCTION MATERIALS NO TECH
CARDBOARD
GLUING STATION
WALL SPACE FOR PROJECT DISPLAY & SHARING
ROBOTIC
SECURITY
COLLABORATION & RESEARCH
CODING
WRITING
SPECIAL COMMUNITY INTEREST
CLEAR BIN STORAGE & STORAGE
ASSORTED PAPERS
ART SUPPLIES
WORK SURFACES

[INSERT YOUR STATIONS HERE]

1.
2.
3.
4.
5.
6.
7.
8.
9.
10.

A community of makers will appropriate their maker space. The most active spaces are those that privilege community over merchandise.Be inspired by what your community members are making and use that inspiration to create new experiences.

IMPORTANT CONSIDERATIONS

IN A MAKER SPACE...

- Everyone can create.
- Makers are encouraged to learn from their errors and failed attempts.
- Students create artifacts expressive of their learning in several curricula.
- All materials are respected, recycled & re-imagined.
- Makers collaborate.
- There are more questions than answers.
- We work towards "yes".
- Timelines are flexible.
- Students are the makers of their learnings.
- Decision-makers conceive, think, share & inspire change
- You are part of a community. Getting help is encouraged!
- Makers recruit makers.
- Technology must be created, not only consumed.

DESIGN YOUR OWN BRILLIANT MAKERSPACE

DESIGN YOUR OWN MAKERSPACE IN ORDER TO #MakeSomethingBrilliant

BRILLIANT NAME	TIMELINE	RESOURCES

BRAINSTORMING ACTIVITIES

Although, this is an ongoing process, envisioning the type of activities before starting a makerspace can inform the design of the space and choice of tools and materials. Coming up with activities can be daunting at the beginning but becomes easier with positive visualization. To help you get started, Brilliant Labs has created a range of diverse maker activities that you can try and remix them to suit your needs. Once you feel comfortable, you can create your own. (www.brilliantlabs.ca/makerfun)

Consider the following learning frameworks for designing maker-centred activities:

PROJECT BASED LEARNING

Project Based Learning (PBL) is a method in which makers learn by actively engaging in real-world and personally meaningful projects. Maker-centred learning is project-centric, where young people are able to experiment, explore, tinker, and learn by designing projects.

COMPUTATIONAL THINKING

Computational thinking encourages makers to explore ways to implement technology in everyday life. It allows them to express their ideas and solve problems by applying computational practices, concepts, and dispositions. In makerspaces, they can design digital and physical artifacts with new interactions and behaviours to develop creative solutions for themselves and their communities.

DESIGN THINKING

Design thinking is a creative problem solving process that encourages makers to identify challenges in their lives, gather relevant information, ideate potential solutions, refine their ideas, and test solutions. At makerspaces, learners find problems and design solutions through critical thinking, curiosity, empathy and iterative thinking.

GATHERING TOOLS AND MATERIALS

Recognizing the creative potential of materials, carefully curate materials to include both familiar low tech and unfamiliar high tech materials.

Some may have rapid prototyping equipment such as 3D printers, Makey Makey microcontrollers and b.Boards available while others may not.

Depending on the type of makerspace and your learning context, tools, and materials will differ at diverse makerspaces.

Makerspaces designed for younger makers will look different than the ones for more mature makers.

Tip: As you plan a list of materials you need, it is helpful to imagine zones or stations for physical makerspaces such as a textile corner, a computer-aided design station, a woodworking station, a multimedia zone etc

Appendix A suggests featured tools and materials commonly used in makerspaces. Having difficulty finding all the materials? Get in touch with us to help you gather the right tools for you.

DEFINING ROLES AND RESPONSIBILITIES

Makerspaces provide creative freedom in many ways. However, if nobody takes proper care of the process and space, the learning opportunities can be negatively impacted. The roles and responsibilities should be clearly defined even though the people involved may take turns to perform specific tasks. It is important to take all the stakeholders into consideration, including the facilitating team, makers, administrators, community workers and volunteers, custodial, facilities and logistics team. Keep in mind that the most successful makerspaces are often those driven by the students and young makers themselves who are engaged and involved at the earliest stages in comparison to makerspaces created only by adults for young people.

SUGGESTIONS FOR RESPONSIBILITIES IN MAKERSPACES:

- [ ] Learning activities design and knowledge management
- [ ] Facilitation and mentorship during making sessions
- [ ] Organization for physical spaces including zones
- [ ] Material organization including storing, colour coding and labelling materials in space, carts and kits
- [ ] Budgeting and costing for future expenses
- [ ] Tools and equipment maintenance including, cleaning, charging, servicing etc
- [ ] Inventory management for materials to keep track of borrowed, depleting, damaged and discarded materials
- [ ] Cleaning and disinfecting the space and supplies
- [ ] Check-in and check out of makers during lunch hours or other non-structured times
- [ ] Planning for the future sustainability of space
- [ ] Managing Partner groups
- [ ] Building capacity within teaching staff or volunteers
- [ ] Engaging youth
- [ ] Engaging Partners and Community Managing volunteers
- [ ] Keeping the space clean and organized
- [ ] Material and equipment purchasing

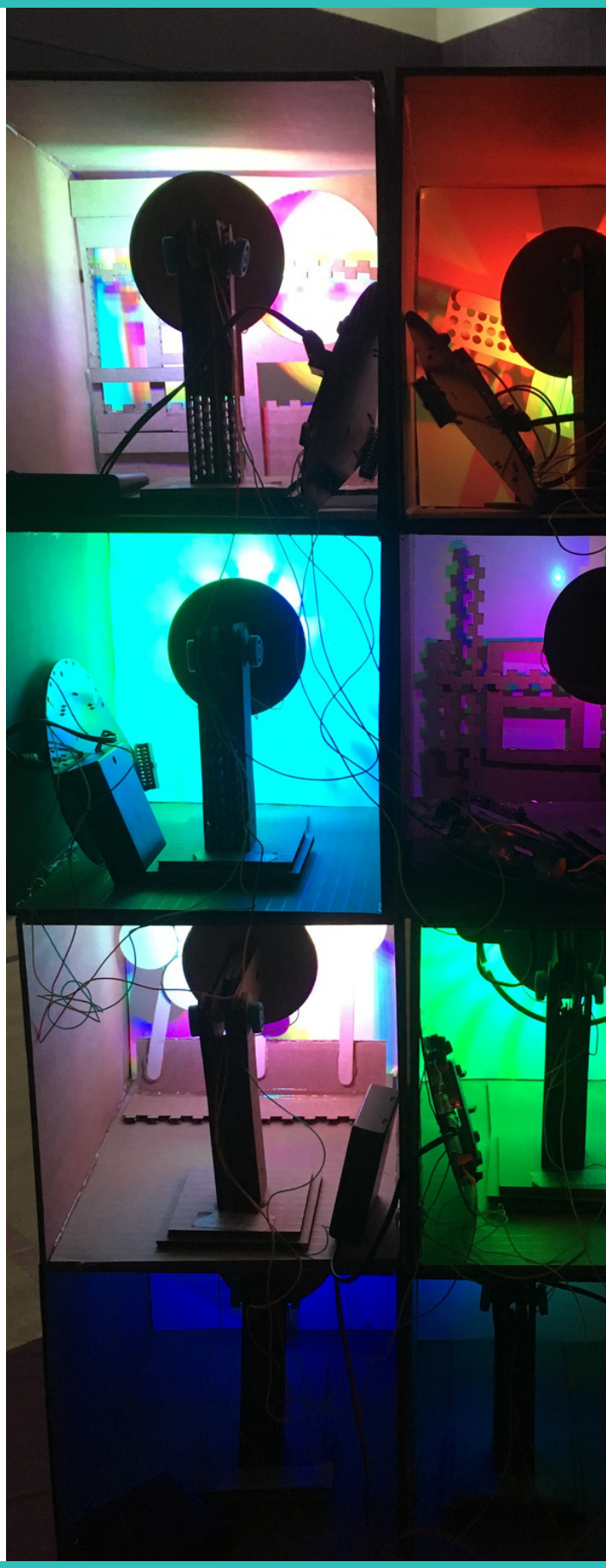
MAINTAINING AND NURTURING A MAKERSPACE

So far, we have explored ways you can start a makerspace. However, setting up a makerspace or makercart is not the only thing that can guarantee creative learning. There are makerspaces that are full of expensive devices that end up getting unused and gathering dust while other makerspaces flourish despite having limited resources by creating wonders with the right process.

What makes maker-centred learning based special is the learning culture that provides young people with creative freedom, embracing their fear and learning in broader and deeper ways. Facilitators need to create this culture of making, providing makers with a sense of meaning and a sense of progress leading to intrinsic learning. They also need to grow, adapt and have a fearless approach to their own learning,

"They seem to be having fun building maker projects, but are they learning something?"

Adults often ask this, questioning the value of fun hands-on activities to foster learning. Furthermore, there are always concerns about meeting specific mandated deliverables and outcomes. Makerspace activities are not separate from these deliverables and outcomes but rather a way to enhance and foster overall learning. The primary difference is that the means is not dispensing information onto young people but rather a process that enables them to learn how to learn and make connections across topics themselves. Here are some misconceptions and fears that we often hear about makerspaces and maker-centred learning. In addition, we share some creative opportunities to resolve them. We hope these strategies will help you to create a maker culture, design projects and explore new technologies in active ways.



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MAKERSPACE MISCONCEPTIONS	CREATIVE MAKING EMPOWERED REALITY	MAKER- CENTRED TEACHING TIPS AND TRICKS
The wow factor! Makerspaces need to be enticing and separate from learning. Flashy LED lights and 3D printers can be used as a reward for makers to do things they don't find engaging.	Creative maker technologies are not just flashy things with the sole purpose of getting attention, but a way for makers to engage in a new type of thinking and expression. Makerspaces give an opportunity to explore complex concepts like computer-aided design, programming and electronics, which can now be pursued in simple and engaging ways. Most, if not can be connected to different subject matters they are learning in schools and community spaces.	Do not use technology as a prize or an extrinsic reward to discipline makers and lure them into doing something they don't want to do. Expose them to technologies as a way to express themselves in creative ways. They can make a light-up greeting card for someone they care about, design a 3D object to solve a problem and make a Scratch animation to tell their stories.
The facilitator's only role is to set up space, give makers a challenge with materials and then stand back and engage as needed.	The facilitator's role is not passive, where they stand back and leave makers to do everything by themselves. On the other hand, they don't need to be too controlling by not letting young minds construct their own learning.	Some makers may have a challenging time with the ideation format. It may be beneficial to conduct 'brainstorming' sessions prior to the activity to give context. • Bring your own curiosities, interests and passions. • Share your own project and reflections to spark the creative process. • Encourage makers to keep going and resolve challenges if they get stuck.

MAKERSPACE MISCONCEPTIONS

You need a lot of money in order to buy expensive tools and technologies and create dedicated space for Makerspaces.

CREATIVE MAKING EMPOWERED REALITY

The design of your makerspace depends on your learning contexts. As we have mentioned earlier in the doc, makerspaces, come in diverse forms. Some have resources and funding to create fully-equipped spaces, while others will go for more accessible and affordable options like maker carts or maker kits.

Making is not just about technologies. Technologies can certainly enhance learning but only if used in the right context. Affordable, low-tech materials can also serve as instruments for young people to bring their ideas to the world.

*Check out Caine's Arcade project where a 9-year old built a massive cardboard arcade inside his dad's used auto parts store: *cainesarcade.com*

MAKER- CENTRED TEACHING TIPS AND TRICKS

Start small and focus on space independent activities that can happen anywhere.

- Focus on technologies that makers will need. Wait until you or your makers have ideas before purchasing big expensive technologies or class kits.
- There are microcontrollers that are very inexpensive that offer a lot of different opportunities for making.
- Don't hesitate to ask colleagues or a Brilliant Labs employee to help find the best alternatives for your projects.

Brilliant LABS LABOS Créatifs

MAKERSPACE MISCONCEPTIONS	CREATIVE MAKING EMPOWERED REALITY	MAKER- CENTRED TEACHING TIPS AND TRICKS
It is difficult to manage large groups in a makerspace.	Makerspaces are manageable when makers are aware of the space, materials and culture. Your first session will set the stage for making. During their first visit, makers can explore some materials, their use, and creative potential in a respectful way. When facilitators set the stage and engage the makers to create one thing during the first visit, they gain an awareness of the design process, collaboration and their role as a maker and designer.	• Teach makers to value reusing and not wasting materials. • Give makers leadership roles in maintaining the makerspace. • Leave price tags on items and talk openly about the makerspace budget, not necessarily by managing every item they use, but by having the makers understand that if they are creating a prototype, they are probably better off using the $1 roll of tape and not the $10 fancier one.
In mainstream schools, the makerspace is not about the curriculum or is separate from the curriculum.	Deeper learning of the curriculum happens through doing. Students as makers will be able to understand the multifaceted aspects of the curriculum.	When we think of the curriculum, we often think of those last pages of the document that contain all of the specific outcomes. We tend to forget the preamble to the subject and the pedagogy. The often forgotten content in those first pages of the curriculum are setting the stage for your school subjects—the front matter matters.

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MAKERSPACE MISCONCEPTIONS	CREATIVE MAKING EMPOWERED REALITY	MAKER- CENTRED TEACHING TIPS AND TRICKS
Creativity is easy. It's decorating our project at the end and what makes our project pretty. It's art!	Creativity is a difficult process. It is not just art but also the ability to use imagination, critical thinking and empathy to create new and meaningful forms of ideas to solve problems. Makers often have a hard time engaging because they have to work harder and have a fear of failure. Find ways to help them create small parts at a time. Those small victories will give them the energy and confidence to do more.	• Use your time in the makerspace in different ways; it could be a challenge, a small project, collaborative, or done individually. • By offering makers different experiences, they will generate ideas. • Some might need time to observe others and get their ideas going. Allow time for observing and collaboration.
Making is loud and messy.	While making is more animated than sitting reading and writing in a library, it is not necessarily messy and loud. Peer collaborations are important in a makerspace. Clear guidelines and norms are as important in a makerspace as they are in any shared space.	• Be explicit in sharing a clear plan with the students to access materials, communicate, move around, clean up and store on-going projects. • Leave ample time at the end of the session to ensure proper cleanup. Everything has its place. Have makers check-out of their workspace to ensure good cleanup.

MAKERSPACE MISCONCEPTIONS	CREATIVE MAKING EMPOWERED REALITY	MAKER- CENTRED TEACHING TIPS AND TRICKS
Makerspaces are dangerous for younger makers.	While there are a lot of tools available in makerspaces, safety is always a top priority. Offering age and comfort appropriate tools and some safety courses for each tool is helpful.	• You won't necessarily have time to show all the makers the tools. Have certain tool experts assigned to help out. • Sometimes, it can be difficult to decide the age appropriateness as makers have different skills and some excel in skills beyond their ages based on their prior experiences. Use our micro-accreditation system developed for your makerspace. Makers will be able to learn new tools. • Label materials using a colour code. See our Tools and Materials list section in this doc with suggested colour-codes.
Tool training is only about how a tool works.	Effective tool training is also recognizing its creative potential and being aware of its opportunities and challenges and ways in which it can help expand learning in diverse contexts.	• Learning through tinkering and exploring the tools should be the first steps. • Keep in mind that facilitators don't need to be experts in every tool before using just curious learners with the right motivation.

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MAKERSPACE MISCONCEPTIONS

Every maker needs a personal project.

CREATIVE MAKING EMPOWERED REALITY

While maker-centred learning offers more personalized learning than a traditional setting, makers can collaborate on a group project in different ways. For example, your group may want to build a community garden. Different groups can be responsible for different tasks: communications, developing partnerships, marketing, developing a self-watering system, testing of materials, building garden boxes, planting the seeds.

MAKER- CENTRED TEACHING TIPS AND TRICKS

- Introduce makers to collaborative projects that engage everyone, allowing them to contribute their individual skills for a larger purpose.
- Allow makers to gain new skills and learn from each other.
- Encourage them to reflect on the process and ways they can apply their new skills for future projects.
- Try open-ended projects where makers add their own creative skills instead of a super guided process where everybody makes the same thing.

MAKERSPACE MISCONCEPTIONS

We have to lock everything up, so we don't lose or break items.

CREATIVE MAKING EMPOWERED REALITY

When makers are aware of the makerspace culture and their responsibilities, they are careful and respectful of materials. Locking-up everything may take away their autonomy and a sense of responsibility.

However, there will be times when some items will accidentally get lost or break eventually. It's unavoidable even when things are locked. Being prepared for such unintended circumstances will alleviate some frustrations.

MAKER- CENTRED TEACHING TIPS AND TRICKS

- Have a check out area for materials that are leaving the space.
- Keep aside a piece of the budget for replenishing materials throughout the year and before the new year.

MOVING FORWARD

MAKE TIME FOR MAKING

When thinking about makerspaces, we need to think about what existed 100 years before and what will sustain 100 years in the future. A small change we make today can make a considerable difference over time. As facilitators, we have the power to make these constructive transformations in our young maker's lives. Similarly, makers also impact facilitator's experiences in multiple ways. Making and learning are collaborative processes in which makers, facilitators, learning organizations, and the extended community co-design meaningful learning experiences. While planning for your maker-centred learning experiences, explore sustainability in all aspects, including spaces, materials, activities, themes and topics. You can think about creative ways in which these elements will sustain the space over a long time.

SEEKING INSPIRATION

Facilitators who make it a priority to reflect on their teaching practice improve maker's achievement. Of course, there are some officially mandated moments throughout the year where you may have to attend some type of professional development (PD), ***but what if you could learn along with a community of enthusiastic educators and mentors like yourself or someone you aspire to become?*** As facilitators, teachers, mentors, and coaches, we often think of young learners, how can we respond to their needs and interests, but what about our own? Imagine being able to learn anytime and anywhere from others, by asking questions, by interacting, by reading, by connecting online. Those informal resources are rich, whole and offer a variety of possibilities for support. By taking professional development into our own hands, we will be more autonomous and flexible. These are great criteria for continuous learning that lead to innovations in teaching and learning practice. Such communities serve as tribes of educators who offer effective, social and cognitive support to other members by influencing their mindset and have a more positive impact on makers' learning. PDs that are offered to enhance certain technical skills, often lead individuals to believe that they are not useful to enrich their practice. These tribes offer support in diverse interests and needs, and they appeal to the growth of the whole integrated educator. Such informal learning opportunities allow us to collaborate with peers and other individuals.

INNOVATION IN THE CLASSROOM

Brilliant Labs has created a guide to innovating in the classroom, which is a tool kit to accompany educators as they create a project within curricula through their passions and favourite tools. This document will prompt you to choose your own instructional adventure and take you through a creative process that will enable you to innovate your teaching practice to reflect your interests, passions and various constraints that you face in your classroom. All the project ideas that we will be sharing in this document are related to the **United Nations Sustainable Development Goals** (UN SDGs) as a way to support student learning and innovation within the context of solving relevant and significant real world problems.

WAYS IN WHICH BRILLIANT LABS CAN SUPPORT MAKER-CENTRED LEARNING

We collaborate with a variety of schools and community organizations to implement Makerspaces. These spaces and programs build on maker-centred learning, encouraging young people to use, explore and experiment with diverse materials and tools to provide an authentic learning experience. Brilliant Labs' makerspaces are supported by our staff members, who can help set-up the design of the space and professional development. Makerspaces, in turn, determine the specific type of equipment needed and are expected to leverage their traditional funding sources, partners and practices. Through our efforts, the maker movement is being implemented in hundreds of communities across Atlantic Canada. We encourage and support to deliver diverse maker opportunities rather than providing a one-off service.

THE FOLLOWING ARE THE WAYS IN WHICH WE CAN HELP YOU TO INTEGRATE MAKER-CENTRED LEARNING EXPERIENCES:

- **Offer professional development/learning (PD/PL). Conduct a workshop Help with maker-centred learning activity design and integration**
- **Convey how to facilitate and manage a group project**
- **Provide training materials for you and your group of makers**
- **Help create partnerships with the community**
- **Share projects, hands-on activity ideas and learning resources**
- **Financially by purchasing or providing materials**

ADDITIONAL RESOURCES

The Maker Movement Manifesto: *Rules for Innovation in the New World of Crafters, Hackers, and Tinkerers by Mark Hatch*
https://www.amazon.com/Maker-Movement-Manifesto-Innovation-Tinkerers/dp/0071821120

The Rise of the Maker Ed by numbers - graphic
https://s3.amazonaws.com/littleBits_pdfs/littleBits-GettingSmart-Infographic.pdf

Project Based Learning by PBLWorks
https://www.pblworks.org/what-is-pbl

Design Thinking in Education by Teaching and Learning Lab at Harvard Graduate School of Education
https://tll.gse.harvard.edu/files/hgsetll/files/designthinkingeducation.pdf

Computational Thinking Framework
https://letstalkscience.ca/sites/default/files/2019-10/LTS-Computational_Thinking_Framework-2018.pdf

Teaching for the Digital Future: *Developing a Pan-Canadian K-12 Computer Science Framework*
https://k12csframework.ca/wp-content/uploads/Teaching-for-the-Digital-Future_WD1.pdf

Brilliant Labs Natural Makerspaces
https://www.brilliantlabs.ca/naturalmakerspace

LOW TECH AND EASY TO USE TOOLS

Assorted Fabrics
Alligator clips
Aluminium foil
Anki
Assorted papers

Batteries (reusable when possible)
Beebots
Bluebots
Botley
Bowls and containers
Bulletin board
Buttons
Button making supplies

Camera
Capacitors
Carbon paper
Cardboard
Computer and laptop
Construction Paper
Copper tape
Cooking utensils
Cosmo
Cutting boards

Dash and Dot
Dropper
Dry leaves

Egg cartons
Electrical wires
Extension Cords

Fan
Felting materials
Figurines
3D Filament
Flowers
Foam sheets

Green cardboard

Hue camera

K'nex/Keva
K8
LED lights
Lego blocks
Light boxes

MakeDo construction kit
Markers
Mbots
Measuring cups
Microphones
Modeling clay

Ozobot

Palettes
Paper clips
Paint brushes
Pebbles and stones
Peg board
Pinecone
Ping Pong Balls

Pipe cleaners
Plastic cups
Plates
Play doh
Pliers
Pom pom balls

Reusable molds
Robot mouse
Rubber bands
School glue
Scratch
Seed pods
Sketching paper
Sphero
Soldering mat
Stapler & staples
Sticks
Soil

Tape
Thread
Twigs

Wall space-display&sharing
Water
Water bottles
Water Colours
Wax paper
White board
Wire stripper
Wooden sticks

Zip ties

TOOLS AND MATERIALS THAT NEED PRIOR EXPERIENCE OR TRAINING

3d printer

Activated Charcoal
Activated Yeast
Agar agar powder
Arduino
Audacity

Baking soda
b.Boards
Blender
Blockscad
Buzzers

Clamps

DC & servo motors
DoInk

Eggs

Food waste
Fusion 360
Fruits & vegetables

Gelatin
Gimp
Glycerine
Green Screen

Imovie
Inkscape

Hammer
Hot Glue sticks

Kombucha (SCOBY)

LDR (light sensors)
Lego Boost
Lego Mindstorm
Lemon Juice
Little Bits

Magformers
MakeCode & other IDEs
Makey makey
Micro:bits
Microwave oven
Mycelium kit-by ecovatice
mushrooms
Multimeter

Nails
Neopixel LEDs

Power Tools
Processing
Push switches

Reed switches
Resistors
RGB LEDs

Sketch Up
Screws
Screwdrivers
Sewable LEDs
Sewing supplies
Spirulina culture

Tea
Tinkercad
Thumb tacks
Turtle stitch

USB cables

Vibration switches
Spirulina
Sugar

Vinegar

Wood glue

TOOLS THAT NEEDS ADDITIONAL SAFETY CONSIDERATIONS & SAFETY

Amino Labs
AR
Autoclave

Beaker

Centrifuges
Conductive thread
Conductive materials

Engineer-it Kit

Fabric
Flasks
Flora lights
Foldscope Kit

Glue gun

Heat Gun
Hot Plate
Hummingbird

Incubators
Knife

Laser cutter

Micropipette
Microscope

Needles
Neodymium magnets

Petri dishes

Raspberry Pi
Robotic kit

Sewable LEDs
Solder
Soldering gun
Soldering tips

Vinyl Cutter
VR

Biosafety cabinet
Broom

Colored tape-zones

Disinfecting-spray & wipes

First Aid Kit
Fire extinguisher
Fume hood cabinet

Gloves
Hand sanitizers
Hair Ties

Mop

Non Slip mats
Noise cancelling headphones

Paper Towels

Smoke detector
Safety goggles

Vacuum cleaners

Zip ties

70% alcohol spray