Photo:
Opal School/ CoLab Tinkering

Photo: CoLab Tinkering

TINKERING

At the core of the tinkering philosophy is a playful celebration of discovery through inquiry, exploration, prototyping, and iterating. It has been said that play is a child's most serious work. Powerful learning opportunities are present when children are allowed to pose their own questions and devise methods for exploring possible outcomes. According to the Exploratorium's book *The Art of Tinkering*, tenets include:

- Be comfortable not knowing.
- Prototype rapidly.
- Balance autonomy with collaboration.
- Use familiar materials in unfamiliar ways.
- Express ideas via construction.
- Revisit and iterate on ideas.
- Put yourself in messy situations.
- Seek real-world examples everywhere.

For a deeper look at tinkering, read the comprehensive paper entitled "Designing for Tinkerability" by Mitchel Resnick and Eric Rosenbaum of MIT's Lifelong Kindergarten group. They summarize the key lessons they've learned from designing contexts for tinkerability:

- Emphasize process over product.
- Set themes, not challenges.
- Highlight diverse examples.
- Tinker with [physical] space.
- Encourage engagement with people, not just materials.
- Pose questions instead of giving answers.
- Combine diving in with stepping back.

STEAMLabs: Blended Approach Based on PBL and Tinkering

Chief Instigator Andy Forest

Photo: STEAMLabs

Our main method of teaching is experiential and interest-driven. Play-based learning is also very important. Our five-step process is as follows:

1. **Explore technology.** Discover something new by experimenting with it. We provide multiple options. This frequently involves taking things apart to see how they work.

2. **Brainstorm ideas.** Think of interesting and useful ways to use technology to make something. Inspired by the exploration and play step, participants can now let their imaginations run wild and come up with ideas.

3. **Make a plan.** Grab some team members and turn your idea into a plan you can execute together. Understand that people have different strengths, and a team is much greater than the sum of its parts. This step first involves selective retention of the ideas formed in the previous step. Refine this into a plan that can be accomplished.

4. **Build, fail, repeat.** Get to work on your creation. Learning how to overcome problems is the best way to learn. We guide participants to solve their own problems and get used to being self-reliant.

5. **Success!** Celebrate your creation by sharing it and your process (more important than the final product) through journals and presentations.

Sample Project: A grade six class designed and built an Internet of Things (IoT) interactive model of Ontario's power system as a museum exhibit to teach about power generation and consumption. This is more than a school project; it's an actual educational installation piece. The finished model was accepted into an exhibit at the Toronto International Film Festival's Digiplayspace.

MakerEd