

STEM at JICS

Nick Song – n.song@utoronto.ca

Much of our tech education is typically/commonly/currently taught by siloing skills to focus on each individually. Skills are developed sequentially by completing relevant tasks. My view, however, is that technology shouldn't be considered a subject of its own, but rather a tool to improve learning in many other areas.

My philosophy of technology education is not focused on particular programs or kits, but rather the broad application and integration of technology skill sets to everyday life. Technology is inherently engaging to children because of the bustling technology-laden world we live in. There is an initial attractiveness to technology because, especially at these young ages, it can sometimes appear to be almost magical. With this in mind, it would be a disservice not to give students exposure to these topics. How else can they discover if they like it or not if they don't have the chance to try? Elementary is the perfect time for children to explore different skills and areas of tech to see what resonates with them.

My approach to teaching technology focuses on the following areas:

- **Open-ended project work**, focused on **creative expression** and **collaboration**. Students learn a lot more than just technical skills by working with others. Project work involves a high probability for inter-peer problems to arise; knowing how to solve these challenges with different classmates is an important skill to practise. Open-ended projects also give students more opportunity for creative expression than working through a set lesson.
- **Computational thinking** - Working through tech projects requires a type of logical thinking that isn't typically required in other subjects, but widely applicable in the real world.
- **Play** - The benefit of incorporating play in tech is that there's less risk and less pressure of getting things "perfect" – because when you work with tech, things are going to go wrong a lot. Play removes the fear of being wrong and makes it easier for students to explore freely.
- **The belief that children are capable** - We often underestimate the ability of young children to pick up technological skills, seeing it as too complicated or too abstract. Through working with these students, however, I have found that although they may

not have the language to explain their understanding, they can often instinctively comprehend many technological processes.

- **Flow** - I strive to provide opportunities for students to discover states of flow while immersed in tech projects. It's so beneficial for students' cognitive development to have the feeling of being entirely focused and positively engaged in the work they're doing.

Early Years - Engaging Curiosity

My framework for tech education in the early years is exploring larger technological concepts away from screens, focusing instead on full body experiences and movement to build foundational understanding. In this way, students at this age can already start to build a general understanding of some seemingly difficult concepts. For example, the concept of algorithms can be experienced by having students break down each step required to prepare for outdoor play in the winter; basic coding can be experienced by directing an animal through a maze ("go two steps forward and then one step left"). A key element of instruction in the early years is giving children many opportunities to ask questions and have new experiences.

Primary - Bolstering Skills

After having broad, foundational experiences in the early years, the primary years program includes more direct instruction to help students hone skills in specific areas of technology. In these years, students go deeper into the topics they are now familiar with and begin learning more language and skills to explore them in a technology setting. Students get their first hands-on experiences with skills such as coding, logical thinking, and design thinking (e.g., 3D Modeling, if/then loops in coding, and troubleshooting issues with their projects).

Junior - Tech with a purpose

In the junior years, students use learned skills to create projects with purpose. By this point, students have already experienced a range of technology tools. Now they explore how to use these skills to help their community or be creative in their own way, really drawing on that "tech as a tool" concept. Students can pull from multiple tech experiences and combine them, in the same way that real engineers and developers do.

Understanding the Tech Behind AI

Before our Grade 4–6 students start using Artificial Intelligence tools, we want them to truly understand how they work. In these grades, we focus on helping students peek behind the curtain through three key steps:

- **How AI Works:** Students learn how AI collects data, finds patterns, and "learns" to make decisions.
- **Hands-on Building:** Using kid-safe, approved educational software, students get to build and train their own simple AI models.

- **Smart & Safe Thinking:** We explore real-world topics like data privacy, online safety, and how algorithms can reflect human biases.

By building this foundation first, students develop the digital smarts and critical thinking skills they need to use technology responsibly and safely.