The Challenge of Writing Design Challenges

MAKER DAY PROFESSIONAL LEARNING

Executive Summary

In May 2016, a group of teachers from the greater Vancouver area travelled to the Innovative Learning Centre at UBC Okanagan to participate in three days of professional development. The training included a full Maker Day event, instruction in learning theories related to Maker pedagogy, and an opportunity to write design challenges for the first time.

The teachers learned that cultivating an intentional mindset begins with a well-crafted design challenge. Identifying an ordinary problem scenario that is relatable, interesting, and worth investigating ignites the design thinking process and compels students to generate a wide range of human-centered solutions. Although some design challenges will appear to unfold effortlessly in the classroom, most teachers quickly realized that writing a really good design challenge is a lot harder than it looks.

Organization Background

The teachers described in this case are thought leaders and change ambassadors within their school district. Some of them had previous experience using Making as an instructional strategy in the classroom, but few really understood the design thinking process, or had any previous experience crafting design challenges. This training was intended to develop their competencies in the design, set-up and district-wide implementation of Making as an instructional approach in support the new ADST curriculum.

The nine teachers in attendance were from various schools in the district and taught at the intermediate/senior level (grades 4 – 9). Participants included a teacher-librarian, a digital literacy teacher, a safe schools teacher, a computer teacher, and a teacher from a traditional shop program. Several of the teachers were also members of the district's instructional support team. A participant-observer from the Ministry of Education was also in attendance.

Setting The Stage

On day one, the teachers participated in a full-day Maker event. Maker Day—as conceived by the Innovative Learning Centre at UBC-O—is an immersive approach to professional development that requires teachers to directly participate in a problem finding and design thinking process. Before teachers can fully understand this instructional approach they must first participate in the maker experience as learners. For some teachers, this was also the first time that Making had been anchored through a structured design challenge with explicit connections to the curriculum.

On the second day, the teachers deepened their understanding of constructionist and constructivist learning theories, and explored the alignment between Maker pedagogy, design thinking, and the new [Applied Design, Skills and Technologies](#) (ADST) curriculum.

On day three, the teachers collaboratively wrote a set of design challenges, based on the same format that you're using in this online course. Module 4 of this course describes the essential components of a well-crafted design challenge, and can also be found on pages 27-28 of the *Taking Making into the Classroom* toolkit.

The participant-observer from the Ministry of Education asked the participants to make explicit connections between their design challenges and the Big Ideas, Learning Standards, and Core Competencies that are embedded in the new curriculum. The workshop facilitator then divided the teachers into four small groups and assigned the task of preparing a draft design challenge by the end of the writing session (approximately 1.5 hours).

Case Description

Designing learning materials is a new skill for many teachers, and like other forms of collaborative lesson planning it's a difficult task. Like any other social constructivist activity this process was messy, and involved a great deal of discussion, debate and negotiation.

Some groups started by brainstorming a list of possible ideas; problem scenarios they considered relevant and meaningful to their students. Many of these scenarios reflected shared problems within the classroom, the school, or the community. Other groups began their process by looking at the new curriculum, and then brainstormed ideas that fit with the Big Ideas and Learning Standards.

A teacher in one group felt strongly that making explicit connections to the curriculum ahead of time would unnecessarily restrict student learning and preferred to let the students immerse themselves in Making with far fewer parameters. This teacher felt that a structured design challenge wouldn't really work and preferred to let students loose in the school Maker space.

Many of the teachers were excited to discover multiple ways in which their design challenge linked to the new Learning Standards, and every group aspired to craft a design challenge with cross-curricular connections. In some groups the teachers found up to twenty or more curricular connections that could be addressed with their design challenges. This decision proved to be problematic when the teachers set out to define the assessment portion of their design challenges.

Since teachers are expected to assess each of the Learning Standards defined in their lessons—and a design challenge is no exception—it was difficult to outline an assessment strategy that addressed these standards in a deep and meaningful way. Some groups started by choosing just two learning areas and limited the number of cross-curricular connections within each learning area. Once these ideas were fully developed it was easier to adjust the scope, if needed.

Each group had a very different scope for their design challenges. One group attempted to develop a yearlong design challenge that connected to several core learning areas. This design challenge was very broad but shallow and the participants did not fully articulate their vision by the end of the writing period. One team created a design challenge that required students to complete the first few stages of the design thinking process at the end of grade 9 with the prototyping and subsequent design phases completed the following academic year at the start of grade 10. The remaining design challenges could be completed in a few teaching blocks.

TAKING MAKING INTO CLASSROOMS

The finished drafts were posted to a whiteboard and each small group showcased their design challenges to the larger group. Following the presentations everyone was invited to take a closer read through of the draft design challenges and post questions or comments using sticky notes.

Here is a list of the feedback that was generated during the review of the rough drafts:

- Your design challenge has a great hook! I can imagine this will really inspire students.
- You've defined a challenge that straddles the summer break. How will you maintain momentum between the end of one school year and the start of the next?
- How will you manage budget constraints?
- I think this is a design challenge for a multi-teacher, cross-curricular project. How does your challenge address the working relationships between the teachers?
- This is a very large project. Is there away to break it down into smaller pieces?
- I love that you've chosen to address a need at the community level.
- How will you educate members of the entire community on different perspectives within the community (cultural differences, aboriginal perspectives, etc.)?
- How will you embed First Peoples Principles of Learning?
- How will students build a prototype of the park? Will the prototype be digital or physical?
- What assessment tools will you use? Performance standards, self-assessment, etc.?
- I love that you've identified external resources (movie clips, websites and books, etc.).
- This is really simple and so flexible. A teacher could reshape this in any number of directions by linking to other learning areas as needed.

Solutions and Recommendations

When you're writing design challenges, it's a good idea to start with the Big Ideas and Learning Standards, as defined in the new curriculum. Identify topics and problem scenarios that are meaningful to your students and hooks them. Problems that are common, ordinary and relatable can be found in every classroom, school, and community. These ordinary problems are just waiting for an extraordinary rethink.

An intentional mindset begins with purposeful and explicit connections to the curriculum. What exactly do you expect your students to learn? An intentional mindset is what separates 'purposeful play' from design thinking.

Control the scope of your design challenge from the start. Begin with a few curricular connections then add more if you need, but be mindful of how this will impact teacher and student self-assessment. Aim for a design challenge that will take one or a few teaching blocks to fully implement. This approach sets everyone up for success. Your students will begin to learn about the design thinking process and you will gain some perspective on what works and what additional scaffolds need to be in place to ensure student success.

Think about safety. We didn't develop a safety plan in our drafts, but as you'll learn in this course its an important consideration. The nature of your design challenge will influence your choice of materials and the tools you bring into the classroom. All tools will require some training when they're first introduced, and some tools will also require protective clothing.

Finally, writing design challenges is an iterative process. Make sure that you give yourself time to think and to refine your ideas. It took each group about 10 hours of thinking, writing and revising—not to mention a flurry of emails back and forth—before the drafts were ready to test in the classroom, and they're still not perfect!

Future or Related Challenges

How would a yearlong or a multi-teacher design challenge unfold? How do you manage scope / costs? How do you maintain momentum? How do you coordinate the activities of multiple teachers working on the same project? What are the benefits of starting with smaller more manageable design challenges before jumping into a complex challenge?

Key Terms and Definitions

Problem scenario: Embeds information that learners are expected uncover through the design challenge. Problem finding is an important part of problem solving.

Safety Plan: Plan that accounts for the safe use of materials and tools.