SECTION 4

ASSESSMENT: REIMAGINING WAYS TO VALUE PROCESS, PRODUCT, CREATIVITY, AND LEARNING

Introduction

Most of us have read Einstein's quote: "Imagination is more important than knowledge." Fewer of us have seen the rest of the quote: "For knowledge is limited to all we know and understand, while imagination embraces the entire world, and all there ever will be to know and understand." Einstein was not suggesting that imagination become separate or opposite from knowledge; rather, he believed the two supported one another in important ways that lead to innovation, creativity, and action.

"When ideas fuel inspiration, the in-between state that leads to action is imagination. We crossed the oceans to discover new lands, invented the means to travel the world, reached for the stars and landed on the moon. All that started as an idea first held in the minds of imagination. Imagination is the highest freedom of all and the one that no one can deprive us of. The greatness of creative imagination is praised not only by the romantics and artists of this world, but the brightest of scientific brains," (Haralabidou, 2015, **https://www.virgin.com/entrepreneur/great-ideas-is-imagination-more-important-than-knowledge**).

Einstein's famous statement on imagination was part of an essay explaining why, at times, he would know something was correct but did not have the facts or proof to know why. He stated, "at times I feel certain I am right while not knowing the reason. When the [solar] eclipse of 1919 confirmed my intuition, I was not in the least surprised. In fact, I would have been astonished had it turned out otherwise. Imagination is more important than knowledge. For knowledge is limited, whereas imagination embraces the entire world, stimulating progress, giving birth to evolution. It is, strictly speaking, a real factor in scientific research," (From A. Einstein, Cosmic Religion: With Other Opinions and Aphorisms, p. 97, 1931).

When we invite students into Inquiry Based Learning and Problem Finding, we are asking them to use both their knowledge and their imagination to envision alternative solutions to complex or wicked problems (see Section 3). We are inviting them to take risks, design alternatives, and engage in risk-taking and critical/creative thinking. Each of the things we ask students to do tend to be processes, and each process takes time to learn and master. It is important to remember that rarely do we bother to inquire into things that are factual knowledge; rather, we inquire into conceptual concerns or big ideas. For example, there is no need to ask about the name of a particular provincial capital. It is more meaningful to ask about why one city rather than another is the provincial capital—what were the economic, political or geographic reasons, etc.

A current issue for many teachers is that traditional, school based assessment tends to be product oriented. However, British Columbia, as well as other jurisdictions, are changing their views on assessment, aligning more closely to Carol Dweck's work on growth that was shared in Section 2. How we value / assess students' learning appears to directly influence their mindset and attitude toward learning. In a study of hundreds of primarily adolescent students, Dweck and her team discovered three significant findings. They gave "each [student] ten fairly challenging problems from a nonverbal IQ test, then praised the student for his or her performance—most had done pretty well. But they offered two types of praise: Some students were told "Wow, you got [X many] right. That's a really good score. You must be smart at this," while others, "Wow, you got [X many] right. That's a really good score. You must have worked really hard." In other words, some were praised for ability and others for effort. The findings, at this point, are unsurprising yet jarring:

The ability praise pushed students right into the fixed mindset, and they showed all the signs of it, too: When we gave them a choice, they rejected a challenging new task that they could learn from. They didn't want to do anything that could expose their flaws and call into question their talent. In contrast, when students were praised for effort, 90 percent of them wanted the challenging new task that they could learn from.

The most interesting part, however, is what happened next: When Dweck and her colleagues gave the students a subsequent set of harder problems, on which the students didn't do so well. Suddenly, the ability-praised kids thought they weren't so smart or gifted after all. Dweck puts it poignantly: If success had meant they were intelligent, then less-than-success meant they were deficient," (Popova, 2014, par. 11–12 **https://www.brainpickings.org/2014/01/29/carol-dweck-mindset/**).

We have worked closely with teachers who want to take making into their classrooms. They recognize that substantial educational change is necessary. Wiggins and McTighe's classic book, *Understanding by Design* (2005), is helpful in identifying ways to change practice. They suggest teachers should begin with the learning outcomes in mind and:

1. focus on teaching and assessing for understanding and learning transfer; then
2. design curriculum "backward" from those ends (McTighe & Wiggins, 2012, p. 1).

Backward design is a helpful way to consider the development and use of design challenges because it encourages us to think about students' demonstrations of learning (the product) as well as the process we want to encourage as they learn. McTighe and Wiggins argue that students truly understand when they:

- can explain concepts, principles, and processes by putting them in their own words, teaching them to others, justifying their answers, and showing their reasoning.
- can interpret by making sense of data, text, and experience through images, analogies, stories, and models.
- can effectively use and adapt what they know in new and complex contexts.
- demonstrate perspective by seeing the big picture and recognizing different points of view.
- display empathy by perceiving with sensitivity and trying to walk in someone else's shoes.
- have self-knowledge by showing meta-cognitive awareness, using productive habits of mind, and reflecting on the meaning of the learning and experience (p. 5).

Wiggins (2005) offers an overview of the backward design approach as well as a template, which can easily be used with the design challenge structure shared in Section 3. As you write your own design challenges or modify those provided in Section 12, you need to consider what the success determinants are for a specific challenge and share them with your students. Wiggin's template might be helpful (**http://www.grantwiggins.org/documents/UbDQuikvue1005.pdf**).

Types of Assessment

We use the term "Success Determinants" because it is more consistent with the iterative nature of the process of design. However, we recognize that teachers need ways in which to assess student learning when making and design are situated within formal, intentional learning settings such as schools. Typically, we think of assessment in three distinct ways:

- **Assessment for Learning**—formative assessment or ongoing assessment that helps teachers modify their teaching and activities to support student learning.
- **Assessment of Learning**—summative assessment typically done at the end of a unit or project. While it does little to improve student learning, it does provide a snapshot of a student's skills and abilities at a specific moment on a specific task.
- **Assessment as Learning**—informal assessment that allows a student to learn more, make modifications, etc. It is aimed specifically at helping the student improve. It might be useful to think of assessment as learning as an ongoing form of coaching.

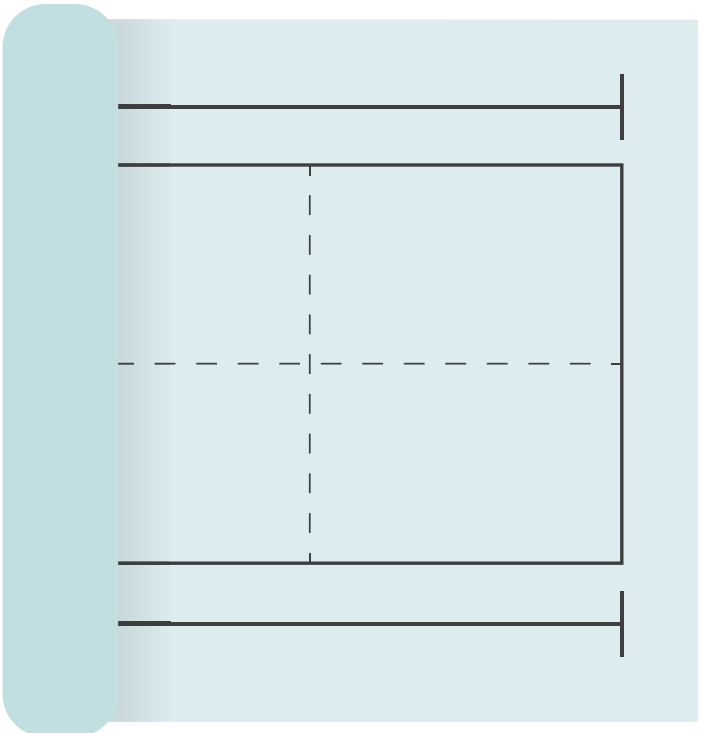
The Board of Studies Teaching and Educational Standards, New South Wales, Australia, clarifies the distinction amongst the three types of assessment, stating, "Assessment for learning and assessment as learning approaches, in particular, help teachers and students to know if current understanding is a suitable basis for future learning. Teachers, using their professional judgment in a standards-referenced framework, are able to extend the process of assessment for learning into the assessment of learning," (2012, par. 3).

Further, they describe Assessment **for** Learning as involving "teachers using evidence about students' knowledge, understanding and skills to inform their teaching. Sometimes referred to as 'formative

assessment', it usually occurs throughout the teaching and learning process to clarify student learning and understanding," (par. 5).

They describe Assessment **as** Learning occurring "when students are their own assessors. Students monitor their own learning, ask questions and use a range of strategies to decide what they know and can do, and how to use assessment for new learning," (par. 6).

They describe Assessment **of** Learning as assisting "teachers in using evidence of student learning to assess achievement against outcomes and standards. Sometimes referred to as 'summative assessment,' it usually occurs at defined key points during a unit of work or at the end of a unit, term or semester, and may be used to rank or grade students. The effectiveness of assessment of learning for grading or ranking depends on the validity and reliability of activities. Its effectiveness as an opportunity for learning depends on the nature and quality of the feedback," (par. 7).



Success Determinants within the Design Challenge Format

When you use a design challenge you will need to determine the type(s) of assessment you want to accomplish and what factors you will accept as evidence of student learning. By adopting a constructionist pedagogy and using an inquiry or problem based learning instructional approach, you will be creating a more open, student centred learning environment. Therefore, identifying the success determinants in the design challenge is essential for fairness and transparency in assessment. For example, it would seem unfair to introduce students to the design thinking process, ask them to collect information, conduct research, create design notes and sketches and then only assess them on the final product of the process. Consider which if the following you might want to include as part of your assessment:

- Students' participation in the group design thinking process
- Students' understanding of key concepts positioned in the Overview and Design Rationale
- Students' understanding of specific content areas or curricular big ideas or competencies
- Students' understanding and abilities with developing skills and using appropriate technologies (tools)
- Students' ability to ask good questions and reflect on the process as well as their shared products
- Students' understanding of the challenge and the quality of the finished product
- Students' creativity and imagination
- Other aspects identified in lesson outcomes or curricular modules

Assessment Tools

Success determinants for a design challenge can be spelled out in general terms for the students. As the teacher, you will probably want to develop an assessment tool that allows you to make a fair and equitable assessment of student learning that might be demonstrated in a variety of ways. Fair and equal are challenging concepts, and open ended, project based

learning pushes teachers to think creatively about how to be fair and accountable to student learning.

There are a variety of assessment tools you might use. We suggest the following:

- **Design Portfolio** – see the How You Might… tip in Section 2. A design portfolio allows you to support your students' growth through reflective, formative dialogue.
- **Rubrics** – used to assess performance along a continuum. Please see Section 12 for the *Simple Machines* Sample Design Challenge. We created a rubric using Rubistar (**http://rubistar.4teachers.org/index.php**).
- **Checklists** – used to record Yes/No observations of students' abilities against specific criteria. Criteria need to be written clearly and linked to specific learning outcomes, skills and abilities.
- **Rating Scales** – observations of students' abilities against specific criteria for assessment along a range—always, sometimes and never; or fair, good, excellent. Criteria need to be written clearly and linked to specific learning outcomes, skills, and abilities.
- **Anecdotal Notes** – teacher recorded observations that are typically informal, short, and describe a student's developing understanding and participation throughout a design challenge or inquiry unit. They focus on behaviours as well as skills and abilities.
- **Observation Checklists** – allow teachers to make quick yes/no observations of what students can do, how they interact with others, and how they are progressing through the process of a design challenge.
- **Portfolios** – a purposeful compilation of design notes, sketches, digital documentation, and other evidence that students are asked to collect throughout the design challenge. Each element of the design challenge (see Section 5) can generate items for inclusion on a portfolio.
- **Peer Assessment** – student peers can use checklists or rubrics to assess classmates' work on a design challenge.
- **Self-Appraisal** – students can use a framework to consider their own learning and achievement within or across specific or open learning outcomes.

For examples of rubrics to assess design thinking and development of empathy, please explore **https://dschool.stanford.edu/groups/k12/wiki/8d33d/Design_Thinking_Assessment.html**.

Teachers know that assessment practices are the tail that wags the pedagogical dog. If assessment stays the same (i.e. only summative or standardized examinations, etc.) then innovative ways of teaching and learning become lost in the battle over what counts as learning. Changes in assessment in British Columbia are going a long way to address this concern and the introduction of the Applied Design, Skills and Technologies framework and curriculum can help us to take making into the classroom in an intentional way.

As David Gooblar writes in his blog, "real learning comes from practice and from awareness of past missteps. When we don't let students redo their graded work for credit, are we telling those students who did poorly that there's no point in trying to learn from their mistakes?

I see two main arguments here:

- The first is that we unfairly reward students who get it right the first time, while penalizing those students who need more time to learn what's being tested.
- The second is that we discourage students from working to learn from their mistakes," (2016, para. 6).

Wiggins and McTighe's work on assessment within *Understanding by Design* offers support to teachers as they make substantial change to assessment.

How You Might...

1. Review the assessment suggestions made in the How You Might... tip in Section 2.
2. Consider ways in which you might integrate success determinants into existing assessment practices.
3. Reflect on the ways in which you currently use the assessment tools and ideas presented in Section 3.

Photo: **Skills Canada Alberta**