Powerful Instruction and Powerful Assessment: The Double-Helix of Learning

by Garfield Gini-Newman and Laura Gini-Newman

*Education should expand horizons, inspire wonder and stimulate the intellect***.**

The Double-Helix of Learning

Nearly 70 years ago, Francis Crick and James Watson ushered in the new era of modern biology when they first published the now ubiquitous double-helix DNA structure first drawn by Crick's wife Odile. A DNA double-helix consists of two complimentary strands of nucleotide bases held together by hydrogen bonds. This 3-D structure represents the most stable conformation for a DNA molecule, based on the chemical and physical characteristics of its building blocks (Gini-Newman, 2019). Similarly, learning can be seen as an organic living force that is dependent on its own double helix. Instruction and assessment - two strands that when linked are the backbone essential for learning to occur. Remove either of the strands and the structure malfunctions, as its ability to serve the purpose of learning is impaired. Also, much like the DNA of life, the strength of the double-helix of learning is dependent on the bonds that exist between the two strands. In other words, assessment and instruction cannot not merely exist as independent parallel components of learning but rather need to be understood as co-existing elements that compliment on one another. They are connected through the intentional use of structures, routines, and practices that promote deep understanding, quality thinking, and provide the essential elements required for learners to flourish.

Assessment and Instruction: The Artificial Divide

A long-standing issue in education has been the unfortunate separation of assessment from instruction. This separation is evident in the fact that in provincial ministries of education across Canada curriculum and assessment branches exist as separate branches, often housed on different floors, and too often pursuing conflicting educational goals. Similarly, in most faculties of education assessment courses stand-alone from methodology courses in which instruction is typically addressed. Although many will claim to examine the intersection between assessment practices and principles of teaching and learning, the focus in assessment courses tends to be on task design, formative feedback and grading; all essential for beginning teachers but also too often disconnected from supporting powerful learning. Consider most rubrics – how well do they actually support students learning? Are they really learning tools or are they scoring tools masquerading as supports for student learning? Furthermore, the unfortunate misunderstanding of formative and summative assessment reinforces assessment as periodic checks on learning rather than an essential element of learning. Far too frequently teachers will refer to the "formative" vs "summative" tasks – which to students translates to work that doesn't count and work that does count. Compounding the problem is the use "summative" assessments as demonstrations of completed learning rather than invitations to engage in learning. In this paradigm of assessment, formative tasks remain periodic checks of understanding or performances that follow a

period of instruction. The introduction of the terms “assessment for, of and as learning” have attempted to clarify the confusion and address this problem. Unfortunately, without a fundamental re-thinking of the relationship between assessment and instruction, assessment as learning will remain an amorphous term that may fit a catchy edu-babble phrase but rarely plays out in a meaningful way.

Harnessing the Potential for Powerful Learning Through Teacher and Teacher-Librarian Collaboration

The past couple of decades has seen an exciting expansion of approaches to learning that attempt to tap into authentic learning opportunities powered by the arrival of new technologies. As information has become increasingly available at our fingertips, educators have realized the need to move away from the mere delivery of content. This has spawned a variety of alternative pedagogical models including the infusion of “Genius Hour” in the school calendar and the creation of “Maker Spaces” within schools. Some educators are advocating for and implementing a “Design Thinking” approach while others advocate for Case-Based, Project-Based or Problem-Based learning. What all of these approaches share is a foundation in inquiry – where students become active participants in the learning process. As we move away from didactic lecture and textbook driven classrooms to more dynamic and active learning, the demands on teachers also increases. In today’s classrooms more than ever, collaboration between teachers and teacher-librarians is an essential part of a school’s fabric.

Teacher-librarians possess a particular skill-set well suited to helping students develop the capacity to navigate the vast resources now available through digital content and to become competent users of information to construct new knowledge. Today’s Learning Commons provide students access to a breadth and depth of information formerly unimaginable even for professional researchers. While opening up whole new worlds to children even in rural communities, this new information age is fraught with considerable challenges. Along with the explosion in information available to students has come the challenge of recognizing fake news, sifting through information that may have no filters, and making sense of disparate perspectives. Engaging children in learning through inquiry in a digital world requires a great deal more than providing an interesting task and time to gather information. It also requires developing the tools of effective digital researchers including; being able to read laterally as well as for depth, to be able to filter information so as not to be either misled or overwhelmed by too much information; to carefully consider both purpose and audience when designing a response to a challenge; and to thoughtfully select the best digital tools to use when engaging in rich and authentic learning tasks.

It is a tall order to expect teachers to deliver an increasingly broad and diverse curriculum differentiated to meet the needs of all learners while ensuring the learning is richly relevant and active. Harnessing the talents of teacher-librarians is vital if we hope to realize the tremendous potential for learning offered when assessment and instruction are brought together as a double-helix of learning.

What should be at the core of our learning goals?

Before delving into the nature of the shift needed, let's define our goals for learning. We propose that for learning to be powerful requires a focus on four key goals – deep learning, meaningful learning, active learning, and connected learning.

Deep vs superficial understanding: To achieve deep learning requires a shift in focus from recall and replication to conceptual and transferable knowledge that has the potential to have a transformative impact on the learner. When students achieve deep understanding they are able to see connections within and between subjects and more importantly beyond school to see the relevance and importance of learning to everyday life (Gini-Newman and Case, 2015).

Meaningful learning: For students to see value in what they are learning it needs to be culturally relevant, awe and wonder inducing, and set within an authentic context. Although some students may be able to achieve deep learning despite a lack of meaning it will fail to engage and inspire a future desire for independent learning. Equally concerning is that meaningful learning that is superficial may capture interest but fail to achieve deep intellectual engagement. Hence there is a need for learning at the intersections of deep and meaningful learning. (Gini-Newman and Case, 2015)

Active learning: Achieving deep understanding through the passive transmission of information, regardless of how important the information is to a subject area, is difficult and antithetical to powerful learning. Students retain better and more deeply understand concepts, ideas and facts when they are actively engaged in constructing knowledge. Knowledge construction involves both the building of background knowledge and conceptual understanding and the application of new knowledge to respond to authentic and meaningful challenges (Gini-Newman and Case, 2015).

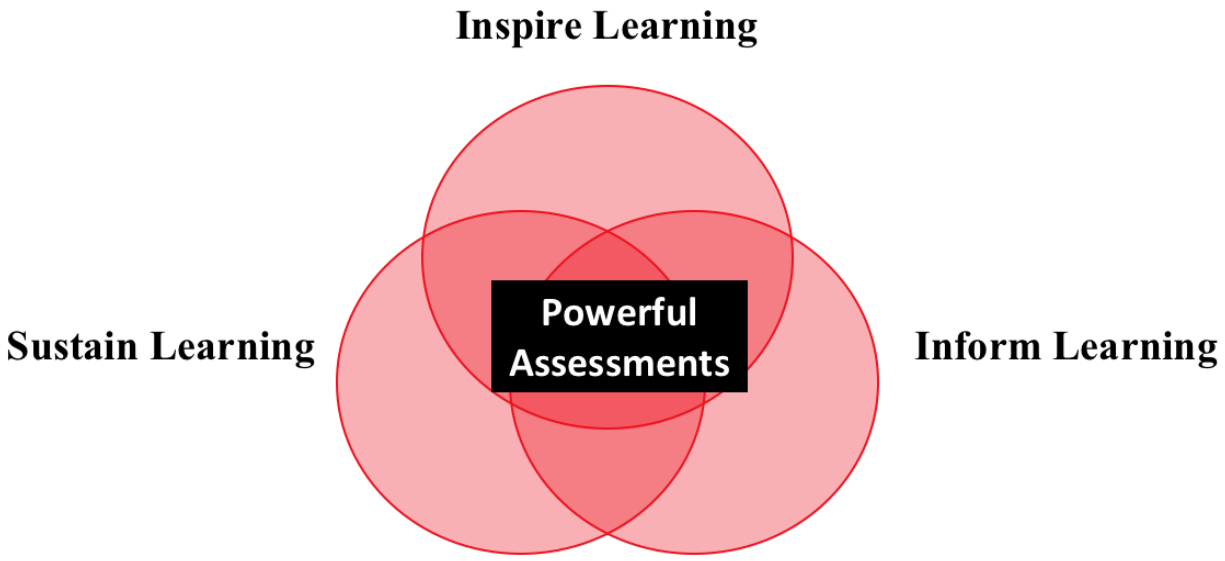
Connected Learning: Powerful learning occurs when we teach at the intersection of deep learning, meaningful learning and active learning. To learn at this intersection requires the constant and seamless interplay between effective instruction and assessment as well as the cultivation of relationships among students and between students and teachers that create a community of supportive learners invested in each other's success.

Powerful Learning Driven by Assessment

1. When the primary focus of assessment is on gathering proof of student learning and the degree of success in achieving learning outcomes, its true value in learning is deeply inhibited. Undoubtedly, it is important to gather evidence of learning so that we can we can make instructional decisions about next learning steps as well as to allow for effective grading and reporting on learning. However, with a focus on empowering students how to learn, we can not only better gather evidence of learning that is valid and reliable but also help students understand and be participants in instructional design as self-reflective learners. What evidence is considered and how it is interpreted to arrive at a fair and reliable

grade matters when determining students' level of success for a defined period of learning. (Rogers,1993). This focus on effective grading brings with it its own set of challenges and considerations but is not the focus of this discussion. When examining the efficacy of assessment as an integral part of learning, our focus needs to be on the key functions of "powerful assessment".

Powerful assessment occurs at the intersection of three essential goals for learning - inspire learning, inform learning and sustain learning.



Of the three key functions of powerful assessment, inspiring learning is most often the one that raises eyebrows. Ask many students and adults as former students if they felt inspired by assessments. Inspiration is not a term they would typically connect to assessment, and in fact, you are likely to find the majority either reply in the negative or are perplexed by the question. A common response is often, "assessments create perspiration not inspiration!" In other words, for most learners, assessments are stress-inducing tasks - activities that are designed as a culmination of learning to measure the degree to which they have been successful. Used as an end of learning measure of success, assessments can seldom be a source of inspiration for engaging in learning and instead create anxiety as students perceive assessments as judgments on their abilities.

Similarly, when assessment tasks and activities are used as either periodic checks or culminating evidence of learning, their effectiveness at informing learning is limited. Used effectively, assessment should provide useful guidance for students that helps them to affirm strengths, revise to improve areas of weakness and to extend learning to push them beyond what they may have thought themselves capable of. Concurrently, assessment should provide clear and useful insights for parents and students on learning progress creating opportunities for parental guidance and support in learning. Of course, ongoing and timely assessments are essential for teachers to be able to

make informed decisions on how to choreograph learning in their classrooms to ensure all students are receiving the guidance and instruction necessary for them to flourish.

Finally, for assessment to truly be a powerful element of learning it must be much more than a periodic check and a culminating activity. Powerful assessments are designed to launch and sustain learning so that they underpin a rich intellectual journey for students by serving as a source of inspiration not merely a demonstration of learning (Scott, 2016). When learning is launched with an engaging provocation that invites students to immediately consider a response, the conditions for sustained learning are set. Under such conditions, every form of instruction, be it a lesson, a field trip or independent work by students, serve to help them develop and refine their response to the challenge that initiated the learning. Through an iterative process of meaningful learning and reflection students develop open-mindedness, perseverance and a willingness to take risks as they see the value in productive setbacks.

Powerful Learning through Instruction

What teachers do matters. Powerful learning needs powerful instruction. When teachers employ powerful instruction that is carefully choreographed to scaffold student thinking they create classrooms that support the natural learning process. For students to be able to engage in deep critical inquiry they require the requisite background knowledge and conceptual understandings that allow them to reach thoughtful and reasoned judgments (Gini-Newman and Case, 2015). Similarly, when teachers ensure students can identify important criteria and equip them with a range of thinking strategies they prepare them with the intellectual tools required for deep learning.

A common misconception around inquiry is that teachers do not need to teach content as, the false belief goes, students will independently uncover the necessary background knowledge through their inquiry. This misconception carries several dangers. First, it often leads to surface knowledge as students see their task as retrieving information related to their area of research. Secondly, the assumption that all students can come to understand complex concepts and detect trends and patterns on their own is naïve at best. In many situations, it takes the skilled use of instructional strategies used by teachers for students to develop a deep and transferable conceptual understanding as well as develop the capacity to think conceptually (Willingham, 2010). Finally, when inquiry becomes mere retrieval of information, the necessary practice and processing of information is lost. For students to develop automaticity in subjects such as math, music and languages or to be able to use historical insights or scientific knowledge, they must be able to recognize patterns and make connections beyond the specifics of the topics they explore (Gini-Newman, 2019). Instruction like this must bond with assessment so that students are also encouraged to monitor and self-assess their abilities to do so. While data and information can be shared or transmitted from the teacher, a textbook or the Internet, knowledge must be constructed by the learner and wisdom can only occur when that knowledge is used in new and current contexts to help make reasonable choices. For students to construct knowledge and for wisdom to be nurtured they must be actively engaged in iterative learning opportunities (Sternberg, 2003). Learning

should always begin with a provocation that invites an initial response and students should be encouraged to continually affirm, revise or extend their response as their learning deepens. By launching learning with a rich and meaningful provocation, students see a purpose to their learning and are able to continually make connections as new learning develops. Powerful instruction that is both active and iterative helps to ensure the conceptual understandings and necessary background knowledge for responding to rich and complex assessments is constructed with students. Through a sustained critical inquiry approach there is a continuous interplay between powerful instruction and powerful assessment as deepening knowledge occurs through effective lessons in which timely guidance is seamlessly woven into the learning processes used in classrooms.

Sustained Inquiry for Deep Learning

The more common means of differentiating inquiry is to consider the degree of student autonomy – from structured inquiry to free inquiry. This can lead to the false assumption that the more learning moves to free inquiry, the deeper the learning. This is simply not true. Whether the inquiry is structured, controlled, guided, or free, the keys to deep learning are the quality of the inquiry and the effective use of intellectual tools that empower learners to draw reasoned conclusions based on what they uncover. Rather than considering the degree of independence, educators should differentiate inquiry by its intent and complexity. Is the inquiry an exercise in retrieval; does it require a critically thoughtful response; or is it an opportunity to develop a rich response to a complex challenge (Gini-Newman and Case, 2015)?

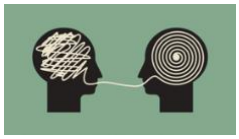
Retrieval

(Inquiring to seek Answers)

Critical Inquiry

(Inquiring to reach a sound or reasoned Answer)

Sustained Critical Inquiry



(Inquiring through a carefully sequenced set of related inquiries that lead to deep understanding and a rich and thoughtfully developed response to a complex challenge)

Re-thinking the instruction-assessment relationship

Beginning in the late 1990's educators were being encouraged to adopt a "backwards planning" approach to curriculum design. In this approach teachers would first identify desired results, then determine the appropriate evidence students would produce to

show learning, and finally teachers would plan instruction to build the necessary understanding to successfully complete the assigned task (Wiggins and McTighe, 1998). The work done around backwards planning, particularly Grant Wiggins and Jay McTighe's "Understanding by Design" has shaped generations of teachers in how they plan and deliver curriculum. Despite the considerable impact of the work, for most teachers the fact remains that curriculum planning is done through a teacher's perspective, not the student's. Generally, lessons are delivered in a linear manner with teachers building students' content knowledge before providing an assessment to measure their degree of success in learning. Through this linear approach to learning, assessment become a series of periodic checks often referred to as "formative tasks" rather than an instructional approach that seamlessly weaves through the learning journey to create learning opportunities.

We propose an iterative approach to learning that extends the backward planning to engage the learner's perspective and create the seamless interplay between effective assessment and instruction. Achieving the powerful interplay between assessment and instruction can best be accomplished when teachers build upon the organization of key conceptual understandings and essential questions that underpin backwards planning through careful consideration and the use of five essential elements:

- Over-arching provocations and challenges
- Learning Launches
- Productive Reflection
- Cascading challenges
- Learning through productive setbacks

Over-arching Provocations and Challenges

Framing learning around rich over-arching provocations and engaging challenges is an important element of inspiring wonder and stimulating the intellect. Too often the most interesting questions and the rich task through which students demonstrate their learning happen towards the end of a body of learning. Flipped on end, provocations and challenges become invitations to learn rather than merely demonstrations of learning, serving as both assessment and instructional opportunities. Rich provocations present students with genuinely debatable questions for which the answers are not immediately obvious or there are no existing "correct" answers or solutions but there are a range of sound or plausible responses. When paired with tasks that invite an authentic product/performance and that has an authentic audience, the use of provocations becomes a powerful organizing component for rich learning.

Sample Over-arching Provocation and Challenge:

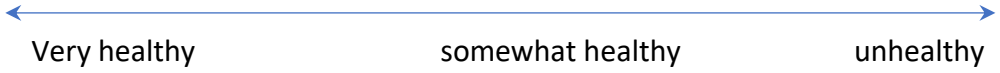
Over-arching Provocation:
Are we living healthy lives?

Over-arching Challenge:
Develop a "Healthy Living Plan" that provides useful advice on diet, stress and active living for a member of your extended family or neighbourhood

Learning Launches
Learning launches are distinct from “hooks” or “minds on” activities in that they initiate thinking around a provocative idea or issue and yield important diagnostic insights. Learning launches also simultaneously serve as an instructional strategy. Initiating learning through effective “Learning Launches” allows students to offer an initial thought or response to an interesting challenge. As student learning progresses they are regularly invited to affirm their initial thinking, revise based on new learning and new insights or to extend their thinking as their understanding deepens. By doing so students learn how to self-monitor and assess their work and how to make meaningful connections. Learning launches can take many forms including a dashboard, a ranking ladder, a pie chart, an invitation to sketch an initial idea, a first attempt at choreographing a dance, or an initial selection of artifacts for an exhibit or poems for a student published anthology.

Sample Learning Launch:

Is your family living a very healthy, somewhat healthy or not very healthy lifestyle?



Productive Reflection
By initiating learning through a learning launch that invites students to offer an initial response to a rich provocation and an inspiring challenge, students are provided the opportunity to take risks and to revise their thinking as their learning progresses. It also affords teachers the opportunity to provide timely guidance that can assist students in making helpful revisions to their responses. The use of Thoughtbooks, Vertical Spaces and Guides to Student Success can assist in ensuring students receive the timely guidance necessary for their learning to grow and deepen.

Despite what the name suggests, a *Thoughtbook* (Gini-Newman and Gini-Newman, 2017) is actually a process rather than simply a physical resource. It describes a continuous and iterative process during which students are invited to provide an initial response to a problematic question or task and then are encouraged through on-going opportunities to either affirm, refine or extend their response as their learning broadens and deepens. A Thoughtbook can take many forms and be used in a variety of ways. What is at the core of the concept of the Thoughtbook is that it supports student learning through an iterative process or responding, learning and reflecting.
The use of vertical spaces, whether whiteboards, chart paper or individual white board slates can also support the iterative learning made possible through just in time

guidance. Inviting students to share their initial thinking on a vertical space, teachers can efficiently gather diagnostic information about the range of views of students. Inviting students to share shifts in their thinking using vertical spaces is an effective and efficient way for teachers to monitor the impact of new learning on student perspectives and understandings.
Finally, Guides to Student Success, which set out the required elements of a task and a clear target for excellence are powerful tools for teachers to provide timely and focused guidance that encourage each student to make the revisions necessary to move their work forward.

Sample Guide to Success:

Guide to Success: Guide to Healthy Living

Task requirements Checklist *(What do I need to do?)*	**Assessment Criteria (excellence)** *What do I need to do to do it well?*	**Self-Reflection** *What's going well? What's my next best step?*	**Teacher Guidance** *What's going well? What revisions might be considered?*
❒ Cover with title and at least one visual ❒ Summary of what is important for the individual to be healthy that addresses: Diet, happiness, and being active ❒ At least three recommendations for what should be included in the diet or avoided ❒ At least 3 recommendations for how stress can be managed ❒ At least three recommendations for being physically active	• Cover is visually attractive and informative • Summary is brief and contains only relevant and important information • All information relates to the person for whom the guide is intended • All recommendations are helpful and possible considering for whom they are intended	**What is going well (affirmed)?** • • • **What needs more work (revise)?** • • • **Where I would like to go next (aspire):** • • •	**What is going well (affirmed)?** • • • **Revisions to consider:** • • •

Cascading Challenges

Sustaining critical inquiry through cascading challenges is a powerful means through which teachers can choreograph the learning experiences required by their students to achieve success in meeting the demands of the curriculum. This involves framing the learning around clear provocations or challenges and then mapping out a carefully sequenced set of related or "focus inquiries" that scaffold student thinking and ensure the necessary concepts, background and competences are developed that will ensure student success (Gini-Newman and Case, 2015).

Developing a set of "Cascading Challenges" is an approach to designing and implementing curriculum that frames learning around invitations to think critically and is based on the following foundational premises**:**

- through sustained inquiry, during which students engage with a rich and meaningful challenge and series of related smaller inquiries, students deepen their understanding over time;
- teachers are transparent so that students are both aware of the broad learning goals and also see the relationship between daily lessons and targets they are trying to hit;

- daily lessons help students build both conceptual and procedural knowledge through lessons that are designed to engage students in “thinking to learn and learning to think”;
- learning occurs through a "fail forward" approach in which setbacks are embraced as an opportunity for further learning; Students don’t fail; they just don’t get it … ***yet.***

Moving learning forward through “Productive setbacks “

When learning becomes a seamless interplay between instruction and assessment students are able to reframe mistakes as learning opportunities that allow them to propel learning forward. Through an iterative learning process, students are invited to offer an initial response to a provocation and are encouraged to reflect forward as their learning progresses. In this manner students are able to confidently take risks knowing that although they don’t fully understand, or can’t do everything *yet,* they will have time to move their learning forward as each setback they encounter will be an opportunity for further learning and refinement to their response to the challenge.

Final Thoughts

Reframing education around the concept of assessment and instruction as a double-helix of learning creates an opportunity to truly realize what it means to claim “the primary purpose of assessment is to support student learning.” When assessment becomes integrated into the daily structures of learning and woven into the fabric of instruction rather than existing separate and apart from instruction, students become reflective thinkers and empowered as independent learners. Assessment and instruction as the double-helix of learning provides educators with a practical pathway to operationalizing many of the core goals that often exist as mission and vision statements but fail to live in classrooms in ways that truly transform learning.

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