Using Thoughtbooks to promote deep learning and innovation through "reflecting forward"

What is the concept of a *Thoughtbook?*

The concept of a *Thoughtbook* borrows heavily from the idea of a graphic designer's sketchbook where ideas are initiated and grow organically. In essence, a *Thoughtbook* is a place for students to get messy with their thinking and to experience learning as "makers and tinkers"[1] of ideas, products or performances. A *Thoughtbook* is a powerful tool for supporting student inquiry, and as such thinking and learning. It provides a naturally intuitive strategy for self-assessment in which students draw on their recent/current learning to reflect forward, continually revising or affirming their understanding and work as their learning progresses. As such, the use of a *Thoughtbook* is tightly tied to the notion of sustained inquiry that is launched by a provocation that invites an initial prediction, speculation, or imagining of a solution to a challenge that invites students to think critically. For example, young children might be asked to design the ideal play set for the schoolyard. They would be provided the opportunity to sketch their initial ideas for the play set in their *Thoughtbooks*. As they learn more about what makes structures stable and safe they would be invited to return to their *Thoughtbook* to either affirm or rethink their designs making revisions to their sketch to ensure they have the safest design possible. Similarly, a high school English student may be asked to use their *Thoughtbook* to record initial ideas and possible opening lines to a short story. As they read short stories and learn about various literary techniques, they would be invited to return to the story they have begun to add more details, integrate literary techniques to make the story more powerful, or even to take their story in a new direction. The two images below are from a Grade 2 student in an elementary school in Ottawa. The children in this Grade 2 classroom were initially asked, with no prior instruction, to sketch an enclosure for an assigned animal (in this case for a monkey) that would keep it safe and healthy. A few days later, following instruction on what animals need to stay safe and healthy the children were invited to return to their *Thoughtbook* when they may have either affirmed some of the elements in their enclosure, added more details or made revisions. Below is the boy's re-thought and re-worked sketch reflecting his new

learning. It is important to note that as the children's learning grew and they repeatedly returned to their *Thoughtbook*, they did not *need* to re-design and re-draw the entire enclosure unless the student deemed a redesign and drawing desirable (in which case they would be intrinsically motivated to do so). Instead the children would often add details to a specific element of the enclosure – perhaps by drawing a close up of a particular section.

Borrowing from the past to inspire the future!

While the label may be new the concept of a *Thoughtbook* is certainly not new. For centuries many of history's greatest minds have jotted down their ideas in notebooks, journals, scraps of paper and even on the walls of buildings! As a young man, Michelangelo scribbled charcoal etchings on the walls of a lunchroom in the basement of the Medici Chapel in Florence where he was working on sculptures to adorn the chapel. Years later, many of the ideas first roughly sketched on those lunchroom walls would appear in the frescoes that transformed the Sistine Chapel. Like Michelangelo, great minds throughout history have used variations of a *Thoughtbook* as a place to initiate thinking, affirm, strengthen and extend ideas, or make revisions, re- thinking and re-conceptualizing to arrive at some of the most fundamental ideas that have changed and allowed us to understand the world. Leonardo Da vinci, Isaac Newton, Charles Darwin, Albert Einstein, Stephen Spielberg, and J.K. Rowling are but of few of history's notables who have used jotbooks, journals, storyboards, and other variations of *Thoughtbooks* to initiate, extend and revise their thinking. The use of various forms of *Thoughtbooks* are not limited to those of exceptional fame. They are, in fact, common in many fields of work from graphic designers, car designers and fashion designers to architects and

landscapers, movie makers, choreographers, video game developers who all employ some sort of a *Thoughtbook* that allows them to capture an initial idea that is then shared, revised, and extended throughout the development process. Given the proclivity for use in many fields, it is surprising how little the concept of *Thoughtbooks* is used in education.

What role do *Thoughtbooks* play in supporting student learning?

To fully appreciate the power of a *Thoughtbook* to support student learning it is helpful to reflect on several of the key competencies for 21st century learning cited by educational jurisdictions across North America and the world. These core competences include:

- creativity
- critical thinking
- collaborative thinking
- self-regulation

In concert with these core competencies there are a number of habits of mind or dispositions that increase the likelihood of students being successful as critical, creative and collaborative learners who are able to self-regulate. Some of these habits of mind include:

- curiosity,
- flexible mindedness,
- persistence,
- risk taking,
- open mindedness.

By launching the learning with a challenge to solve that inspires students to continually revisit, affirm, and/or revise their initial thinking, teachers can help to nurture several of the habits of good critical, creative and collaborative thinkers. The *Thoughtbook* provides an effective mechanism for supporting the development of deep understanding while engaging/igniting student curiosity, encouraging persistence and risk taking and

rewarding open-mindedness and flexibility through the application of new learning. ~~to solve enigmatic challenges.~~

How does a *Thoughtbook* differ from a notebook or a journal?

Although journaling has long been a part of the education landscape, journals have typically been used to have students reflect backwards on work completed. In fact, a Bachelor of Education student at an Ontario university recalled with dismay having to "reflect on the reflections they had completed during the year"! While there is value in reflecting back~~wards~~ on work completed, the relevance and value of these reflections are seldom made clear to students and are even more often not acted upon. As a result, the act of reflecting back on previous learning leads to minimal improvements on student learning and often occurs by change rather than with purpose and intention.

Used to reflect back on learning completed, journals provide a check for understanding and opportunities for assessment for learning however they do little to promote perseverance, risk taking or innovation. While traditional journals may encourage a degree of meta-cognition, the results are often disappointing because the reflections are seldom connected to revisions that may lead to a more successful end product or performance. Instead they are often perceived by students to be a burdensome task to be completed to meet teacher requirements rather than a useful tool to aid in learning and innovation.

The primary purpose for a *Thoughtbook* is to make explicit the purpose and value in reflecting back on learning. By reflecting back to move thinking and learning forward students see genuine purpose and value in the act of reflecting. *Thoughtbooks* also nurture and support innovation by encouraging students to live with a problem longer and to embrace set backs as a vital part of the learning process. "Failing forward" encourages students to test ideas, maintain an open mind, explore new avenues and consider new or unexplored possibilities.

Notebooks, like journaling have long played a role in education and again, while valuable, serve a different role than a *Thoughtbook*. Student notebooks allow students to

record information and ideas in an orderly fashion so that they can be easily retrieved, reviewed and referenced when needed. By contrast, *Thoughtbooks* by their nature are often messy as they focus on the development of the student's thinking rather than on the orderly, sequencing cataloguing of facts and information. As ideas evolve, expand and are re-thought students will often cross out, annotate, or ad̶d̶e̶d̶ new details to their initial thinking. While notebooks traditionally provide a linear record of content and concepts transferred from the teacher or text to the students, *Thoughtbooks* provide a record of the organic growth of a student's thinking and ideas and the application of this thinking, content and concepts to an authentic challenge.

How does the *Thoughtbook* support effective assessment?
The conception for the use of a *Thoughtbook* provides powerful supports for effective assessment. Firstly, the *Thoughtbook* supports ***assessment as learning*** as students continually reflect forward by applying new learning and their emergent understanding of concepts to help them refine and extend their response to the challenge. Secondly, it supports ***assessment for learning*** by providing teachers with ongoing evidence of student learning that allows them to provide immediate and on-going feedback to students. Furthermore the evidence provided by teacher perusal of a few *Thoughtbooks* each day helps to guide instructional decisions ensuring a focus on the intellectual/thinking tools needed to improve student success. Finally, *Thoughtbooks* provide a visible record of student thinking over time allowing, for a more powerful ***triangulation of assessment evidence*** by contributing to the body of evidence teachers gather through observation and conversation. w̶h̶i̶c̶h̶ ̶i̶s̶ ̶o̶n̶-̶g̶o̶i̶n̶g̶ ̶w̶i̶t̶h̶ ̶t̶h̶e̶ ̶s̶t̶u̶d̶e̶n̶t̶s̶ ̶i̶n̶ ̶r̶e̶s̶p̶o̶n̶s̶e̶ ̶t̶o̶ ̶i̶d̶e̶a̶s̶ ̶c̶a̶p̶t̶u̶r̶e̶d̶ ̶i̶n̶ ̶t̶h̶e̶i̶r̶ *T̶h̶o̶u̶g̶h̶t̶b̶o̶o̶k̶s̶.̶* This triangulation of the assessment evidence allows for a focus on the quality of thinking demonstrated – even if the product falls short of the ideal.

What might a *Thoughtbook* Look Like?
Thoughtbooks can take many forms including both traditional hard-copy approaches and virtual *Thoughtbooks* using various cloud-based applications. By definition, a *Thoughtbook* is a means of capturing the evolution of ideas from the first

conception/response through revisions, re-conceptualization and extensions as students progress through their learning. Consequently, a *Thoughtbook* could take the form of a series of storyboards, sketches, audio recordings, video recordings, notes, thinking maps, equations and so on. As they are intended for use with any subject or grade level teachers, a few factors need to be considered when implementing a *Thoughtbook*:

Age: Younger children need to have opportunities to work with both visual and written explanations of their thinking. A *Thoughtbook* in the primary grades should be designed so as to encourage children to capture ideas in pictures and words. While students may begin with a rough drawing or a cut out picture of their idea, over time as they build their motor skills and vocabulary, they can be encouraged to add relevant labels and annotations within their *Thoughtbook*. Similarly, in cases where students are acquiring a new language, the *Thoughtbook* can be used as a place for students to select and assemble or create images to capture initial ideas that are labeled and annotated as comfort in the language develops.

Subject Matter: *Thoughtbooks* need to reflect the diversity of ways humans communicate ideas by recognizing and valuing multiple forms of "language" including musical notation, mathematical literacy, science notations and so on. To encourage the use of communication within a domain, *Thoughtbooks* should be used to encourage students to explore communicating their ideas using multiple mediums, representations and forms of notation. While they should be encouraged to use domain-specific ways of communicating, the *Thoughtbook* should also be promoted as a natural vehicle for integration as students explore various ways to express and re-frame their thinking in a way that best supports the development of their understanding and thinking about complex ideas and provocative issues.

Nature of the Task: The primary purpose of the *Thoughtbook* is to help students think deeply about important and provocative issues in the curriculum. The more authentic the task to which a *Thoughtbook* is attached the more likely students will see the

relevance and therefore be engaged in the learning. By extension, if the *Thoughtbook* is to be seen as a useful vehicle through which students can explore and develop their ideas then it needs to have a clear connection to the task. Dance students choreographing a dance may want to create a series of short videos to help them think through their revisions, while music students may wish to create a series of audio recordings. When being asked to create a video or dramatic skit students might employ storyboards in their *Thoughtbook* while science students may include sketches, notations and still images from labs.

Ease of Use: If *Thoughtbooks* are to support students in their thinking and learning it is essential that they be presented in a manner that is user friendly to the student. It is advisable that teachers present a variety of ways that students can capture their thinking and allow students to self-regulate by selecting the means that best advances their learning. If a classroom chooses to use an e-portfolio as a vehicle for the *Thoughtbook*, students still need to be allowed to sketch by pencil, jot notes on paper or scribble drawing as needed. They can then be encouraged to digitize their thoughts captured on paper and add them to their e-portfolio. Similarly, if the T*houghtbook* were to take the form of an artist's Sketchbook teachers need to be cognizant of size and portability so that carrying the journal with the student does not become a barrier to its use.

Frequently Asked Questions.

Q: Do students need to re-draw their sketch or re-write their response each time they go to their *Thoughtbook*?

A: No, it is not necessary for students to completely redo their response to a challenge each time they record ideas in their *Thoughtbook*. Using a Cascading Challenge approach, each new challenge students engage with will invite them to think more deeply about a particular aspect of the larger over-arching challenge. Often, *Thoughtbook* responses will be to a specific aspect of the larger challenge and students will record new ideas relating the specific detail being considered. For example, the children designing a butterfly garden may have been considering types of flowers that would attract

butterflies. They would not need to re-draw their whole garden, but would sketch in flowers they would add to their garden (they may also cross out plants they had initially considered). Similarly, a class considering how individuals can contribute to making the world a better place might focus on what people can do in their day to day lives to reduce air pollution. When they go to their *Thoughtbooks*, they would not need to re-write their ideas but would simply add a few new ideas to their sketch, list of description.

Q: How much should teachers direct the timing and nature of the entries in the *Thoughtbook*?

A: The long-range goal of the use of *Thoughtbooks* is to nurture self-regulated learners so that students routinely use some variation to capture interesting ideas and allow ideas to grow and change as their learning deepens. Like any habit, teachers will need to help make continual reflecting forward a routine part of learning. For this reason, it is recommended that teachers regularly create authentic opportunities for students to connect their learning on a topic to the rich over-arching challenge that has been designed to drive the learning. There are a variety of ways teachers might remind students to connect their new learning to their emerging ideas in the *Thoughtbook.* They might simply ask students to share with one other student a key idea or understanding that emerged from the lesson they can use to solve the challenge, then go to their *Thoughtbook* and connect the learning to the challenge. Teachers might ask students to consider how the lesson affirmed their thinking with regards to the challenge, led to an idea for a revision, or helped identify what they wish to aspire to? Teachers might also provide a template or a capture sheet of some kind that students complete during the lesson that they are invited to add to their *Thoughtbook* to further their thinking on the issue. Finally, teachers might provide a visual support such as a series of dashboards or ranking ladders for students to use to respond to an issue and following each class they add another copy of the dashboard or ranking ladder to their *Thoughtbook* on which they would record any new thinking. In this way, a record of their evolving response to an over-arching issue is developed over time.

Q: Should teachers write in students' *Thoughtbooks*?

A: Yes and No. The *Thoughtbook* should create an opportunity for dialogue between the teacher and the student with the shared goal of deepening the child's thinking, understanding and ability to use their new learning in authentic contexts. The primary purpose of the *Thoughtbook* is not evaluative in nature but rather to create the vehicle for critical, creative and collaborative thinking to flourish. To this end, teacher comments in *Thoughtbook*s should always be framed so as to invite consideration of alternatives, additional opportunities to reflect forward, or seek clarification of ideas. The comments should avoid being evaluative so that students do not come to believe they need to decode the desired answer or response of the teacher. If teachers are going to write in students' *Thoughtbook*s, it is best to use Sticky notes rather than writing directly on the drawings or notations in their *Thoughtbook*. When using Sticky notes, try to leave space for student responses to you so that the dialogue is truly between teacher and student and not just notes from teacher to student. Students may wish to jot down responses to your questions or comments including a clarification or a justification for a choice their have made. It is important to remember that the *Thoughtbook* is designed to invite students to take responsibility and ownership over their own learning. Any teacher comments should serve to further promote this purpose.

Q: How does the evidence yielded by a *Thoughtbook* impact on assessment and evaluation

A: *Thoughtbooks* can potentially yield two important types of assessment evidence. By providing a place for students to apply their learning through initial speculation, predictions and drafts teachers are able to immediately gather diagnostic evidence and begin to monitor conceptual understanding of the course material. Of equal importance is the evidence regarding learning skills yielded by *Thoughtbooks*. The integration of *Thoughtbooks* into the learning process provides teachers with concrete and on-going evidence of self-regulated learning, initiative, perseverance, work habits and collaboration. This evidence allows teachers to ground their assessment of learning skills in a body of evidence that can be easily shared with parents or form the basis of a

powerful student-led conference with parent. By yielding evidence relating to both learning skills and understanding of curricular goals, teachers are able to adjust their teaching and target the supports necessary to support every child's learning. *Thoughtbooks* also contribute to the triangulation of assessment data. By providing visual evidence of the evolution of student thinking, teachers are better able to engage in meaningful conversation about the learning and thereby can gather assessment data through observation and conversation. While it would not be advisable to mark a *Thoughtbook*, as it would undermine its use as a place for students to get messy with their thinking, the evidence yielded by a *Thoughtbook* can help teachers make a more informed judgment about student learning, especially when taking a risk in creating an end product or performance that is less successful than the student had hoped. Using the observational and conversational data gathered through the *Thoughtbook* allows teachers to assign a grade more representative of the student's true learning.

Q: Do students need a *Thoughtbook* for every subject?

A: Not necessarily. *Thoughtbooks* are intended to be used with a rich, over-arching challenge. In many cases these challenges may be cross-curricular or in high school may be interdisciplinary. *Thoughtbooks* should be connected to rich, authentic tasks rather than specific subject. In cases where the rich, authentic challenges are confined to a single subject there would be a *Thoughtbook* for each subject.

Q: Do students always need a separate book or binder for their *Thoughtbook*?

A: Not necessarily. *Thoughtbooks* are intended to be a space to capture thinking about an authentic challenge. This space could be digital (OneNote or Evernote; Google doc. Etc.) allowing for video, images, audio recording or models to be captured and stored as ~~the~~ thinking evolves. Teachers and students may find it easier to reserve a section in a binder or other form of notebook rather than having a separate *Thoughtbook*. Whatever form the *Thoughtbook* takes, the key is that it is used as a place for students to capture their thinking and create a visible record~~ed~~ of the evolution of their thinking and response related to an over-arching challenge as their learning deepens.