Popular discourse on education as well as recent findings in the learning sciences tell a similar story. The model of education typical of 20th century classrooms was effective for that era of human history, but the ‘knowledge society’ we now live in requires new thinking about what constitutes effective and engaging teaching and learning. Teachers are now faced with the challenge that “former conceptions of knowledge, minds and learning no longer serve a world where what we know is less important that what we are able to do with knowledge in different contexts.” (Friesen, 2009)

The power of inquiry is its potential to increase intellectual engagement and foster deep understanding through the development of a hands-on, minds-on and ‘research-based disposition’ towards teaching and learning. Inquiry honours the complex, interconnected nature of knowledge construction, striving to provide opportunities for both teachers and students to collaboratively build, test and reflect on their learning.

It is crucial to recognize that inquiry-based teaching should not be viewed as a technique or instructional practice or method used to teach a subject. Rather, inquiry starts with teachers as engaged learners and researchers with the foundational belief that the topics they teach are rich, living and generous places for wonder and exploration. Inquiry is not merely ‘having students do projects’ but rather strives to nurture deep, discipline-based way of thinking and doing with students.

As as entry point, inquiry involves learners:

- tackling real-world questions, issues and controversies
- pursuing curiosities and interests within a meaningful topic
- developing questioning, research and communication skills
- identifying and testing hypotheses within a collaborative setting
- solving problems or creating solutions
- collaborating within and beyond the classroom
- developing deep understanding of content knowledge
- participating in the public creation and improvement of ideas and knowledge
- becoming confident and independent learners

“The meaning of ‘knowing’ has shifted from being able to remember and repeat information to being able to find and use it.” (National Research Council, 2007)
Inquiry is a umbrella term that covers a number of other approaches to teaching and learning. Teaching practices that utilize a disposition of inquiry learning include:

- problem-based learning: learning that starts with an ill-structured problem or case-study
- project-based learning: students create a project or presentation as a demonstration of their understanding
- design-based learning: learning through the working design of a solution to a complex problem

As contrasted with more traditional forms of teaching and learning, inquiry emphasizes the process of learning in order to develop deep understanding in students in addition to the intended acquisition of content knowledge and skills. Inquiry draws upon a constructivist learning theories where understanding is built through the active development of conceptual mental frameworks by the learner. This approach is supported and enhanced by a broad research base which has identified three key implications for effective instructional practices:

1. Students come to the classroom with preconceptions about the world. This means teaching practices must draw out and work with students preexisting understandings and make student ‘thinking’ visible and central to the learning.

2. Competence in an area of study requires factual knowledge organized around conceptual frameworks to facilitate knowledge retrieval and application. Classroom activities should be designed to develop understanding through in-depth study of curriculum topics.

3. Meta-cognition (thinking about thinking) helps students take control of their learning. Opportunities for students to define learning goals and monitor their own understanding need to be embedded into classroom tasks.

If we are to make use of these important findings from the learning sciences, inquiry should be viewed as a highly structured and thoughtfully designed endeavour. As contrasted with ‘minimal-guided’ inquiry which has been shown to be marginally effective as a teaching technique, (Hattie) classroom tasks that are worthy of students time and attention, relevant, connected to the world and organized around the ‘big ideas’ of a subject can develop understanding, intellectual interest and engagement with students.

For inquiry to be effective requires significant intellectual investment on the part of teachers to design learning tasks that are connected to the disciplines, to their students’ lives, and to the world, while focused toward clear and achievable learning targets. It requires that teachers see themselves as learners and researchers of both the subjects they teach and their professional practice as a whole.

**Inquiry as Playing the “Whole Game”**

One way to conceptualize inquiry based learning is the notion of “playing the whole game,” an idea by David Perkins, professor at the Harvard Graduate School of Education. Perkins begins with the belief that teachers generally approach the complexity of teaching in one of two ways:
Students learn isolated skills and knowledge. Starting with the simple building blocks of a particular topic and then building to more complex ideas. While this appeals to common sense (think of the efficiency of an automobile assembly line), the problem with this approach is the removal of any context to the learning, making deep understanding of the content less likely. Perkins calls this approach elementitis, where learning is structured exclusively around disconnected skills and fragmented pieces of information.

Students learn about a particular topic. This approach is frequently utilized in history and science where students are taught about other people’s ideas but rarely if ever given the opportunity to produce and refine their own ideas. Perkins calls this aboutitis where learning is equated with consuming knowledge or information, without developing the critical thinking or creative, knowledge-building skills necessary to transfer knowledge to novel situations.

The solution that Perkins offers to the typical classroom experience is what he calls learning by wholes, structuring learning around opportunities to experience or engage in the topic as it would exist outside of school. Using the metaphor of a baseball game, Perkins believes that the experience of most students involves either learning isolated skills (i.e., only ever throwing a ball) or learning about the game (i.e., studying baseball statistics or the history of baseball) without ever getting out onto the field and participating in an actual game. In a classroom setting, this means providing opportunities for students to experience the ‘whole game’ of mathematical thinking or scientific problem solving or historical analysis of primary source artifacts.

It is important to note that focusing on the elements of a topic, or learning about a topic are not necessarily bad approaches to teaching and learning. Rather, they are important tools for teachers to use in a classroom environment. However, the issue arises when learning is focused solely on elementitis or aboutitis, the usual practice in most classrooms. With an inquiry-based, or whole-game approach, authenticity and relevant learning tasks provide the necessary context and engagement into which other teaching practices such as learning the elements or background about a topic can be embedded in a more productive way.

This notion by Perkins leads us to an important point, that an inquiry-based approach is most effective when it is carefully designed and structured by teachers. Inquiry should not be confused with ‘discovery learning’ where students are left to explore and develop understanding on their own. Rather, inquiry is a complex combination of structured learning with intentional opportunities for students to create, design, imagine and develop new possibilities.

An analogy when considering the design and implementation of inquiry is the notion of play. Here we should see play not as a childish activity or games but rather in the way put forth by John Seely Brown; play as the creative tension that exists between rules and freedom, between what is known and unknown. Just as play requires rules to keep a game going, inquiry needs structure and boundaries to be effective. As compared with more traditional delivery models of teaching and learning that focus only on pre-existing knowledge or skills, inquiry remains open to the unknown, to the ‘not yet.’ As teachers are considering inquiry in a particular topic it becomes helpful to consider how students might ‘play’ within a topic, that is, maintain an emphasis on what is already known (the foundational concepts or key-ideas) while allowing for space for the unknown where students can create, design, interpret or participate.
Structuring Inquiry with Liberating Constraints

Another approach that frames inquiry as a carefully designed experience for students is the notion of liberating or enabling constraints (Davis, Sumara and Luce-Kapler, 2000). “Liberating constraints describes the balance between freedom and constraint that creates conditions for learning and creativity.” (p. 87) This is the act of structuring learning, not in the sense of a pre-determined, closed plan of action, but rather an organic, biological understanding of structure, where organisms respond and adapt to changing conditions. The authors refer to the etymology of structure as "describing how things spread out or pile up in ways that can't be pre-determined, but that aren't completely random either." (p. 49) Here again we see how powerful learning occurs in the space between what is known and structured and what is yet to be. When designing learning around liberating constraints teachers should balance the authentic constraints put on a task from within the discipline or topic itself with space for students to participate in the experience through their own creativity and individual voices and experiences.

So far we have addressed inquiry as a complex approach to teaching and learning that strives to foster deep understanding in students by providing opportunities for active involvement in learning. The challenge for teachers is to move inquiry from being a theory or idea to being a disposition that unpins how teachers view their students, subjects and their own teaching practice.

While we need to view inquiry as being more than just a technique or methodology, there is also danger of such a far-reaching definition of inquiry being a nebulous and potential meaningless concept. With that in mind, it becomes necessary to establish some common principles and guidelines to move the discussion from the abstract to the practical. As a guiding framework, the Inquiry Rubric developed by the Galileo Educational Network is a powerful tool for educators. Designed with purpose of making the notion of inquiry-based teaching and learning more concrete, this rubric focuses on 8 elements of strong inquiry-based practices:

1. Authenticity
2. Deep Understanding
3. Assessment
4. Appropriate Use of Technology
5. Student Success
6. Connecting with Experts
7. Performances of Understanding
8. Ethical Citizenship

The remainder of this document will work through these 8 elements providing examples, resources, rubrics and guiding questions to assist teacher as they plan inquiry-based learning leading to student engagement and deep understanding.
AUTHENTIC LEARNING AND TEACHING

“Authenticity includes tasks, activity or work that is associated with a result or outcome that has clear meaning and value to the student.”
(Scblehty, 3)

The first element of strong inquiry is an authentic learning task where students are engaged in work that is worthy of their time and attention, is personally relevant to them and deeply connected to the world in which they live. The development of authentic learning tasks for students means first and foremost situating learning in rich places and contexts (think: topics, topos, topographies) where curriculum outcomes can brought to life with real world connections, stories and relevance. Therefore the starting question for inquiry is ‘what is the topic?”

Harvard’s Teaching For Understanding (TfU) project uses the term generative topics as the starting point. Effective topics are generative in the sense that “they often have a bottomless quality which leads to deeper questions” and consist of four elements:

1. Central to a domain or discipline. This involves an approach to curriculum that engages students in developing understanding around the questions, controversies, and modes of inquiry central to a topic.

2. Accessible and interesting to students. The selection of a generative topic considers student experience, interests, learning modes or intelligences, cultural background, and resources.

3. Interest to the teacher. For teachers to introduce students to the elaborate, interconnected webs of information central to a discipline requires the teachers to have an understanding of the subject matter and ways of inquiry within that topic. Teacher interest and curiosity about a topic will increase the teachers investment and provide a model of engagement for students.

4. Connectable. Powerful generative topics are connectable in two ways: (1) to students previous understanding about the subject and (2) to other ideas and concepts within and across disciplines.
As we begin to design inquiry-based teaching and learning, teachers can consider the idea of authenticity in one of two ways:

1. **Authentic to the real world.**

   This approach involves creating learning opportunities that are linked to relevant current events, topics or real-world connections designed to increase student engagement and interest. In this way a particular classroom task is designed around questions, issues, problems or explorations that actually exists in the world.

   As an example, grade 6 students engaged in a mathematical inquiry built around the question, "are there enough trees in Canada's boreal forest to be considered the lungs of the earth?" This example used a real world context as the hook or entry point for student engagement into the mathematical study.

   **Examples of ‘real-world authenticity’:**

   On his widely read math blog, Dan Meyer shares a number of ‘real-world’ mathematical problems rooted in the use of multimedia and pop culture to engage students in mathematical thinking.

   As the task for a grade four humanities project, students planned and designed a sustainable community located in a particular geographic region with Alberta. Students researched the resources, geographical features, and environmental challenges faced by a particular region and designed small community based on basic principles of sustainable development.

   As part of a grade 9 study of government, grade 9 humanities students hosted a forum for candidates in a local municipal election. Students hosted the real world forum, taking in questions for candidates from other schools, as well as broadcasting the event publicly across the Internet.

2. **Authentic to the discipline at hand.**

   A second way to consider authenticity is to create learning tasks that align with the ways of thinking or modes of inquiry central to the topic. As Larry Rosenstock, CEO from High Tech High Charter Schools explains, “I want kids behaving like an actress, scientist, documentary filmmaker, like a journalist. Not just studying it but being like it.”

   Seen this way, the purpose of authenticity is to create opportunities for students to take on ways of thinking and adopt standards of evidence that are central to a particular discipline. An authentic inquiry study could involve students spending significant amounts of time doing field work, design work, labs, interviews, or studio work. Alternatively, a rich inquiry-based approach to mathematics would support students in identifying patterns, developing mathematical hypotheses, testing mathematical conjectures, and creating proofs while working with engaging problems, puzzles or sets of data that are not necessarily tied to real world contexts.

   “I want kids behaving like an actress, scientist, documentary filmmaker, like a journalist. Not just studying it but being like it.”

   Larry Rosenstock, CEO, High Tech High
**Examples of 'discipline-based authenticity':**

The Galileo Educational Network provides a number of ‘worthy and robust’ math problems and puzzles for both elementary and secondary students. These problems are designed to open up foundational concepts in mathematics and create possibilities for students problem solving and mathematical thinking.

During a grade 5 study of wetlands students took on the ways of data collection utilized by scientists in the field. After becoming experts in particular elements of water quality, students were allowed to develop hypotheses about various water samples taken from a nearby wetland and then use water probes to test and compare the five water samples collected.

In order to demonstrate their understanding of simple machines, grade 8 students used a virtual physics simulator to create and test digital ‘Rube Goldberg’ machines. The software allowed students to exercise their creativity and imagination in integrating the different elements of the curriculum.

---

**Inquiry Rubric: Authenticity**

<table>
<thead>
<tr>
<th></th>
<th>Beginning</th>
<th>Developing</th>
<th>Accomplished</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Authenticity</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The inquiry study originates with and only meets programs of study expectations.</td>
<td>The inquiry study originates with the program of studies but provides some opportunities to extend beyond curriculum expectations.</td>
<td>The inquiry study originates with a generative topic, problem, or exploration that engages the students emotionally and intellectually while rooted in the program of studies.</td>
<td></td>
</tr>
<tr>
<td>The task/s would not likely be tackled outside a school setting.</td>
<td>Other adults outside the school are intrigued by the task/s and can find ways to contribute to it.</td>
<td>An adult at work or in the community might actually tackle the question, problem or exploration posed by the task/s. It is deeply connected to life and work beyond the school.</td>
<td></td>
</tr>
<tr>
<td>Students are required to follow clearly defined approaches to teacher-generated criteria.</td>
<td>Students are offered a menu of approaches in order to meet specific learning outcomes.</td>
<td>The study is structured around methods of inquiry and ways of thinking that are central to the disciplines that underpin the topic, problem or exploration.</td>
<td></td>
</tr>
</tbody>
</table>

---

**Guiding Questions for Authenticity:**

Where does this topic live in the world?
What are some of the current questions that experts are wrestling with in this area?
What will students find relevant about this topic?
Why would someone care about this topic?
What are the ways that experts in this field do their work?
What counts as evidence or proof within this topic?
How might students access or create authentic sources of data on this topic?
Where will students have the opportunity to solve problems, test ideas, recognize patterns, or invent build or design a solution or product?

**Thinking about Technology and Authenticity:**

What technologies are used by people in this discipline?
Are there particular tools, technologies, types of data, sources of information, etc that experts in this areas utilize?
What tools might allow students to collect data in ways similar to experts?
Teaching for deep understanding

Structuring learning around authentic tasks, questions and problems provides great opportunity for student interest and intellectual engagement. However, to make this engagement productive, it is crucial to consider the connection between the topic or task at hand and the intended learning goals of the study. As Linda Darling-Hammond reminds us, “authenticity affords opportunities for learning, but does not guarantee it.” While designing learning around real world problems, issues, or tasks can lead to student interest, it does not necessarily translate into productive understanding and knowledge transfer.

The challenge for educators is to make use of the engagement that is made possible through authentic, hands-on learning in ways that develop deep understanding of the subject at hand.

Conceptual Frameworks

One of the important considerations for teachers when planning for inquiry is to consider how the knowledge and skills central to a particular task fit into a conceptual framework about a topic of study. Building such a conceptual framework requires laying out the ‘big ideas’ of a topic, and then considering the organization and structure of knowledge and skills around those ideas. A knowledge base which is flexible and usable requires organization around key guiding principles within a topic.

One of the best ways for teachers to begin the planning of an inquiry task is to work through a concept mapping exercise themselves. Working ideally in collaboration, teachers would map out the different concepts and skills that students as a way to consider the framework of understanding they hope to develop with students. A concept map will help to guide and narrow the study, as one of the potential pitfalls of an inquiry approach is that a study becomes large and overwhelming.

As a guiding question for the development of a conceptual framework, a teacher may ask the question:

*What is the one concept students need to know in order to really understand a particular topic?*
Learning Goals

With that in mind, it’s important to consider that educational research consistently reinforces the crucial importance of clear and manageable learning goals for students. One of the instructional practices that has the greatest impact on student learning and achievement is to provide students with a explicit understanding of what they are to be learning and how to move forward. This is applicable across all teaching approaches, including inquiry-based learning. (Hattie)

As teachers are in the planning stage of a learning task, they should consider what learning goals will be at the heart of the study, and how these goals might be explicitly stated and publicly visible. Developing learning goals should also consider how ‘phantom skills’ (skills that are often alluded to but not explicitly taught, i.e., group work) will be addressed through the task. Doing the work of uncovering the deep learning goals for a particular task requires significant intellectual work by teachers, work that is most effectively done in collaborative discussions during the planning of a learning task or study. Students should have ready access to the learning goals, and the different elements of a task or project should be closely tied to improving student understanding of those goals.

To assist with the development of learning goals teachers might ask themselves:

What do you want your students to get better at through this task?

Addressing Preconceptions and Misconceptions

One of the key ways to foster deep understanding is to unearth and address students’ pre-conceived ideas about a particular topic. In a comprehensive research analysis on learning, the National Research Council discovered that if students’ initial understandings are not engaged, they may fail to grasp concepts or may revert to preconceptions after the classroom task is completed.

For example, in history education, students often rely on stereotypes or oversimplifications, viewing history as a struggle between simple concepts of good and bad. As teachers are designing work for deep understanding, it is important to consider the common misconceptions that students bring to the topic, and plan learning that will allow students to draw out and work with those preconceptions.

Throughline Questions

One approach to the creation of learning goals is to develop throughline questions which run through an entire unit, or course or year-long study. Throughline questions are thoughtfully designed overarching questions that help frame and guide the task. When designing throughline questions, teachers can begin by asking: what do they want students to understand by the end of your class?

As an example, in Social Studies, teachers might consider developing throughline questions that connect to three S’s, asking provocative and relevant questions that encourage connection between Self, the Subject matter and the Society in which they live.

“Effective teaching structures material to be learned so as to help students fit it into a conceptual map, integrating carefully designed direct teaching with hands-on inquiries that actively engage students.”

(Linda Darling-Hammond)
Deliberate Practice

There is a great deal of research highlighting the importance of repeated exposure to content in order to develop real learning in students. For example, Hattie claimed that three to four exposures to an idea is necessary for students to learn a concept.

Repeatedly reinforcing content, concepts, or skills should not be viewed at odds with inquiry, and also does not have to equate to ‘drill and practice’ worksheets that involve repetitive questions for students to answer. Rather, deliberate practice “can also involve specific skills and complex performances.” (Hattie) Once learning goals have been established, the challenge for teachers is to provide students with multiple and varied ways to practice and improve on the key learning goals.

As part of his ‘whole game’ framework, David Perkins calls this ‘working on the hard parts’, and suggests that teachers should design both learning exercises and études that address common misconceptions or troublesome knowledge in a particular area.

<table>
<thead>
<tr>
<th>Guiding Questions for Deep Understanding:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Through this study I want my students to understand that ...</td>
</tr>
<tr>
<td>Through this study I want my students to appreciate ...</td>
</tr>
<tr>
<td>What is worth knowing about this topic?</td>
</tr>
<tr>
<td>What do you want students to get better at through this task?</td>
</tr>
<tr>
<td>How will the goals of this task connect to broader goals for the term or year?</td>
</tr>
<tr>
<td>What learning activities will you plan that are directed toward building deep understanding of the key learning outcomes?</td>
</tr>
<tr>
<td>What habits of critical thinking will your students practice during the task?</td>
</tr>
<tr>
<td>What common misconceptions or persistent trouble spots do students have about this topic?</td>
</tr>
<tr>
<td>What will make this topic/question hard for learners (specific to the topic)?</td>
</tr>
<tr>
<td>Why are these spots difficult?</td>
</tr>
<tr>
<td>How will you address them?</td>
</tr>
</tbody>
</table>
Research has repeatedly shown that assessment practices used by teachers have a significant impact on student achievement and engagement and that substantial learning gains can result from providing students with frequent feedback about their learning. Additionally, it is lower-achieving students that will benefit the most from effective summative assessments.

Strong assessment practices must be woven into the continual practices of an effective learning environment, and this is especially true in an inquiry-based study. It is assessment practices that form the bridge between the learning goals and the tasks, making clear to students and teachers what should be learned.

As seen in the previous chapter, having clear learning goals and conceptual frameworks are important components of inquiry. Teachers should create opportunities for students to receive targeted feedback on those learning goals, and the feedback should be directed at students getting better at the intended learning with explicit suggestions for improvement.

Linda Darling-Hammond suggests three critical elements for assessing meaningful learning:

1. design intellectually ambitious performance assessments that define the tasks students will undertake and apply the concepts and skills in authentic and disciplined ways

2. guide student efforts through evaluative tools such as clear task guidelines, rubrics and exemplars of strong work

3. frequently use formative assessments to improve student learning and guide teachers’ instructional practices throughout the process.

According to Darling-Hammond, “time should be built into projects or problems for students to reflect deeply on the work they are doing and how it relates to larger concepts specified in the learning goal, including deep questioning about process and understanding.”

While building formative feedback structures into an inquiry task does involve additional time, research has shown time for self and peer assessment results in larger learner gains, even if whole class time is taken away from discussing content.
There are a number of different forms and tools that can be used for assessment in an inquiry-based classroom. It is key to remember that exemplary inquiry-based teaching uses a combination of formative assessment practices in order to gain a complete picture of student understanding. These include: (Darling-Hammond)

- Rubrics to provide specified levels of progress and excellence
- Solution reviews where students show work in progress to peers, teachers and other community members
- Whole-class discussion can be used to vet and refine ideas and explanations
- An additional short-term performance task to assess the application of understanding to a new situation or context
- Written or digital journals used to keep an ongoing record of experiences and reflections and struggles
- Multimedia explanations of understanding
- Portfolios collect work over time to demonstrate progress and improvement
- Weekly written responses to a simple set of questions throughout a process
- Self-assessments where students evaluate their own work according to criteria using a rubric or focused question
Guiding Questions for Assessment:

- Are the learning goals for the task clear and visible to all learners?
- Have you included students in setting the assessment criteria for the task?
- Are there clear and direct connections between the key learning goals and the assessment criteria?
- Where are the places you will check for student understanding throughout the task?
- How will the design of the study intervene to increase student understanding?
- What will you collect and/or observe as evidence of student understanding?
- Does this count as evidence of deep understanding of the key learning outcomes?
- How might you involve parents in the assessment practices?

Thinking about Technology and Assessment:

- How might technologies be used to make the learning goals clear and visible to students?
- What technologies might be used to increase formative assessment?
- What tools would allow for increased peer-feedback?
- What tools would allow student work to be shared with experts or parents to increase feedback loops?
- How might technology allow students to demonstrate their understanding in a variety of ways, including multi-media forms of expression?
Digital technologies can support inquiry in rich and complex ways due to the wide array of possible hardware, software, peripherals and web tools available to teachers. Technology allows both teachers and students access to current, multimedia forms of information, powerful collaboration tools, the ability to model and simulate ideas, and the potential to communicate learning in a wide variety of ways to a global audience. When thoughtfully designed into an inquiry-based study, technology can help immerse students in engaging and rigorous knowledge-building environments and allow them to create compelling representatives of their understanding.

What is most critical is that teachers should always begin with the intended learning outcomes before considering what technologies (if any) might support and amplify the student learning. For example, if a teacher is working with students on determining patterns from large sets of numbers, excel may be the appropriate tool to use so that students can sort and resort data, manipulate sets individually or as wholes, and to test their conjectures regarding perceived patterns in ways that a calculator may not.

<table>
<thead>
<tr>
<th>Ineffective Technology Integration</th>
<th>Effective Technology Integration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learning limited to classroom space; learning is limited by lack of access to physical equipment and supplies</td>
<td>Collaboration, sharing of ideas, building knowledge is not limited to the classroom – students continue to work and learn at home, on field studies; technology permits access to learning resources in lieu of specific equipment or supplies (e.g. the use of simulations versus the purchase of expensive scientific equipment with limited function)</td>
</tr>
<tr>
<td>Learning happens only during class time; homework replicates work done in class; no opportunity for collaborative knowledge building</td>
<td>Technology permits anytime, anywhere learning; other invested parties have ongoing access to the knowledge-building endeavor (parents, experts, other students, teachers, administrators, etc.)</td>
</tr>
</tbody>
</table>
Possible applications for digital technologies:

**Locate current information**
Technology allows both teachers and students immediate access to current information, statistics and data on a given topic. As finding information is one of the most regular activities students use digital technologies for developing critical information literacy skills is of the utmost importance. Technology also allows students to access information from multiple viewpoints and perspectives on a issue, something not always covered by textbooks or pre-made resources. Information can be accessed a range of ways including: web searches; online databases (Gapminder), virtual museums and galleries (Google Art Project); geographic information tools (Databasin, GPS devices, geocaching); mapping tools (Google Earth); and survey creators (Google Forms, Survey Monkey).

**Tinker with ideas**
With technology, students can test ideas, hypotheses and solutions. This can be done with a number of tools include calculators and spreadsheets (for testing mathematical ideas and patterns, Excel, Numbers, Google Docs); peripherals (digital cameras, science probes); and simulation software (Geometer's Sketchpad, Geogebra, Algodo, Google SketchUp, Netlogo).

**Organize and synthesize concepts**
Students in an inquiry-based study will often be tasked with making sense of complex and interconnected ideas. Students can organize and synthesize their understanding through a number of tools including: mindmapping software (Inspiration, cMap, Mindmeister); interactive drawing tools (Paint, SMARTboards); infographics (informationisbeautiful.net); and multimedia digital posters (Glogster).

**Communicate understanding**
One of the most transformative attributes of digital technology is how it allows students to represent their understanding in a number of different ways. Through the use of emerging technologies student have access to relative simple yet incredibly powerful multi-media authoring tools for text, image, audio and video production. Tools for powerful communication include: text (Word, Pages, Google Docs, InDesign); image manipulation and remixing (Photoshop, Gimp, Aviary); audio production (Garageband, Audacity, Aviary); graphic design (Illustrator, Fireworks); screen capture (Gawker, Quicktime, SmartRecorder); video production (iMovie, Movie Maker, Animoto); Animations (Flash, cameras); and presentation tools (Powerpoint, Keynote, Prezi, Pecha Kucha).

**Collaborate and share with others**
Technology allows students to produce work, receive feedback and communicate with online collaborators ranging from students in their class or school to experts and others around the world, including sharing the progress and process of the study with parents. Technology can also create audiences for student work that extend beyond the walls of the classroom. There is a wide range of collaboration tools including: collaborative cloud tools (Google Docs, iCloud, Dropbox, Voicethread); knowledge building communities (Knowledge Forum, Intelligence Online); video conferencing (Skype, Facetime), website development (iWeb, Posterous, Dreamweaver, Weebly, Google Sites); blogs (Edublogs, Wordpress, Apple); wikis (Wikispaces, PBwiki); and online broadcasting (Ustream, Livestream).
Programming
One of the lesser utilized yet incredibly rich applications of technology is programming. Programming requires that students visualize complex ideas, understand and solve problems, consider elements of design and develop logical thinking skills. A number of programming tools exist for educational contexts including: Logo, Scratch, Squeak and Makerbots.

Participate in learning communities
Technology not only allows learners (including teachers) access to information but also to networks of people. Social media sites such as Facebook and Twitter allow teachers and students to develop their own learning networks. Other online learning communities include Classroom 2.0, the Global Education Collective, the Future of Education and the Flat Classroom Project.

<table>
<thead>
<tr>
<th></th>
<th>Beginning</th>
<th>Developing</th>
<th>Accomplished</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technology is used for the sake of using technology, not because it will enhance the inquiry. The study is built around the technology used.</td>
<td>Technology has relevance to the inquiry. Students have choice into which technology is utilized.</td>
<td>Technology is used in a purposeful manner rooted in disciplined ways of thinking and doing. The nature of the work determines the appropriate technology being used.</td>
<td></td>
</tr>
<tr>
<td>The major focus is on developing skill and fluency with software applications.</td>
<td>The study uses technology to conduct research, share information, make decisions, solve problems, create meaning, test theories and communicate, mainly inside the classroom.</td>
<td>The study requires students to conduct research, share information, make decisions, solve problems, create meaning, test theories and communicate with various audiences inside and outside the classroom.</td>
<td></td>
</tr>
<tr>
<td>The ongoing inquiry study is not available online.</td>
<td>Students have ongoing, online access to the study as it develops.</td>
<td>Students, parents and the larger community have ongoing, online access to the study as it develops.</td>
<td></td>
</tr>
</tbody>
</table>
As we have addressed above, one of the hallmarks of a strong inquiry-based study is that it immerses students in the foundational concepts and ideas of a topic. In addition to emphasizing deep understanding of concepts, inquiry provides opportunities for students to engage in, wrestle with and ultimately improve their own ideas and the ideas of their peers. Framing inquiry this ways begins to move a classroom into a knowledge-building space, where ideas are treated as objects and made public to be refined, revised and connected to other ideas by the learning community. “Knowledge building results in the creation or modification of public knowledge—knowledge that lives ‘in the world’ and is available to be worked on and used by other people.” Scardamalia and Breiter, (2002)

The hallmarks of rich knowledge-building classrooms include elements such as:

- **Real ideas and authentic problems.** In a knowledge-building classroom learners are concerned with understanding, based on real problems in the real world.

- **Improvable ideas.** Students' ideas are regarded as improvable objects.

- **Idea diversity.** In the classroom, the diversity of ideas raised by students is necessary.

- **Rise above.** Through a sustained improvement of ideas and understanding, students create higher level concepts.

- **Democratizing knowledge.** All individuals are invited to contribute to the knowledge advancement in the classroom.

- **Knowledge building discourse.** Students are engaged in shared discourse to improve the knowledge advancement in the classroom.
Framed this way, a knowledge-building classroom strives to move learning along a spectrum from shallow constructivism to deep constructivism:

<table>
<thead>
<tr>
<th>Shallow Constructivism</th>
<th>Deep Constructivism</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students are engaged in activities and tasks that are not directly linked to the explicit improving of foundational ideas. Students can describe what they are doing (the activity) but show little understanding of the underlying concepts or ideas.</td>
<td>Students are engaged in a collective inquiry into a specific topic, and coming to a deeper understanding through interactive questioning, dialogue, and continuing improvement of ideas.</td>
</tr>
</tbody>
</table>

**Inquiry and Performances of Understanding**

Another hallmark of inquiry-based learning is that students demonstrate and deepen their understanding through approachable yet challenging performances of understanding. Underpinning this belief is the notion that understanding comes about through extending, synthesizing, justifying, explaining, applying or utilizing what they know in new ways and situations. As David Perkins writes, “to gauge a person’s understanding at a given time, ask the person to do something that puts the understanding to work - explaining, solving a problem, building an argument, constructing a product. What learners do in response not only shows their level of understanding but very likely advances it.”

We see in learning that happens outside of school and in most fine arts classes, where student learning is directly tied to performances of understanding. Think of students in music or graphic design classes where there is most likely a clear and direct link between the intended learning goals and the authentic performances or public demonstrations of that learning. Performances in these areas are a key part of the learning process, not something that is done after the learning is over. Such performances are often public in nature and open to critique for the purpose of improvement.

In inquiry-based classrooms, teachers strive to create performances of understanding across all subject areas. Such performances of understanding could be open-ended ‘messing about’ used at the beginning of a study, or small tasks throughout a larger inquiry (formative assessment) or larger scale culminating performances at the end of a project or study.

According to the Harvard Graduate School of Education, effective performances of understanding have the following qualities:

- Relate directly to learning goals
- Develop and apply understanding through practice
- Engage multiple learning styles and forms of expression
- Promote reflective engagement in challenging, approachable tasks
- Publicly demonstrate understanding

“Instead of rehearsing or recreating knowledge produced by others, performances of understanding engage students in creating their own understandings.”

Harvard Graduate School of Education
Guiding Questions for Performances of Understanding:

Do students have the opportunity to choose the most appropriate way to communicate their findings/understanding?

Does the study create a knowledge-building environment where ideas are central and made public?

Does the study involve students sharing and improving their own and each other's ideas?

Does performance tasks provide opportunities for students to flexibly use and apply understanding, rather than merely practice and repeat it?

Thinking about Technology and Assessment:

Is it possible for students to choose the most appropriate technology to communicate their findings?

How might technology be used to capture student learning and make it visible within and beyond the classroom?

How might technology facilitate the sharing and improvement of student ideas?

Can technology be used to create novel situations, problems or cases that invite students to apply their understanding?
Connecting With Experts

When students are engaged in authentic, real world tasks, issues or problems, a natural outcome will be developing connections with experts as part of the learning process. As we have seen, inquiry strives to develop deep conceptual understanding and disciplined ways of thinking and doing. While teachers might be passionate learners in some curricular topics they cannot be expected to have a breath of foundational knowledge and understanding in all areas. Outside experts then play a key role in helping teachers design inquiry around the ‘right’ questions, topics, issues and problems. Utilizing experts can occur in a number of ways including:

- Practicing experts assisting teachers during the initial design phase of a project to ensure the study is built around current issues and questions.

- Experts visiting a classroom (either in person or through technology) to ground the study in current information and provide authentic feedback to students.

- Using expert work samples to guide the design, outcomes and success criteria for a study.

Connecting with experts can make an inquiry-based study more authentic and engaging for both teachers and students because:

- Experts (or expert work) can introduce student to the most current and accurate information, data and questions from a particular topic or discipline.

- Experts (or expert work) can provide standards for excellence based on standards from the real world.

- Experts (or experts work) highlight how the work students are engaged in mirrors work conducted in disciplines outside of school.
Guiding Questions for Connecting with Experts:

Who in the world works in this topic?
What organizations/experts can be contacted to assist with the planning of this project?
What organizations/experts might be willing to collaborate with students about this topic (either face-to-face or digitally)?
How might student work be shown to experts to get feedback and suggestions for next steps?
Are there places where real world exemplars can be used to guide the study?
Who is the audience for this task?
Can an authentic audience for student work be found?

Thinking about Technology and Connecting with Experts:

What technologies might be used to connect with experts?
What technologies could be used to show real-world exemplars to improve student performances?

<table>
<thead>
<tr>
<th>Connecting with Experts</th>
<th>Beginning</th>
<th>Developing</th>
<th>Accomplished</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students hear or read about relevant information only from the teacher, or resources provided by the teacher.</td>
<td>The task involves speakers or interviews with experts outside the classroom, (e.g. one-shot visits, presentations by experts)</td>
<td>The task provides opportunities for students to collaborate with relevant experts in a variety of situations. Students use experts (or expert work) as mentors (or examples) for their own work.</td>
<td></td>
</tr>
<tr>
<td>The task is designed by the teacher(s) in isolation (without expert input).</td>
<td>The task is designed by the teacher in consultation with an expert regarding the topic of inquiry (which may include reading a relevant book or accessing current data on the topic).</td>
<td>The task is designed and implemented by the teacher in collaboration with an expert who provides ongoing feedback to teachers and students. (Feedback may occur in the form of rubric criteria based on expert work).</td>
<td></td>
</tr>
<tr>
<td>The study requires students to communicate what they are learning with a presentation to teacher audience (i.e., handing in as an assignment).</td>
<td>The study requires students to communicate what they are learning in a presentation to the classroom audience.</td>
<td>The study requires students to communicate what they are learning with a variety of audiences through presentation or exhibition.</td>
<td></td>
</tr>
</tbody>
</table>
Another of the key principles behind inquiry-based teaching is involving students in the design and management of the learning, allowing for the development of goal setting, task-management, appreciation of different perspectives and group work skills. One of the strengths of adopting an inquiry-based approach is how well it aligns with the Universal Design for Learning (UdL) framework. Many of the ideas previously discussed already address the needs of diverse learners including:

- Creating learning tasks around topics of relevance, value and authenticity
- Fostering collaboration and community with students
- Increasing mastery-oriented feedback loops
- Carefully structuring learning to minimize threats and distractions

“Universal Design for Learning means many things, but the general idea is to create learning environments which can be individually adapted to learner needs. In other words, the environment adapts rather than forcing the learner to.”
Ira David Socol
Michigan State University
College of Education

During the planning for inquiry, to meet the needs of all learners teachers should consider:

- Ensuring that students have access to a variety of sources of background knowledge that are displayed in a variety of ways such as websites, videos, images, podcasts and other multimedia forms of information.
- Providing clear explanations of the desired conceptual understanding and big ideas. Having targeted and visible outcomes for the learning makes it easier to guide processing, visualization, pattern recognition and connection making.
- Allowing students to represent their understanding in a variety of ways. Here technology can play a significant role as students can use multiple media and tools for construction, composition and communication.
- Promoting goal setting, personal task management and different roles and responsibilities with a group setting to allow all students to build on their strengths and natural interests.
### Guiding Questions for Learner Success:

Are there places where the students can set goals, deadlines and self-organize during the task?
Can students have the opportunity to take on different roles in the study?
What social skills be modeled or explicitly taught in the task? (i.e., effective group work, powerful feedback, etc)?
How will the complexity of an inquiry study be chunked into clear and manageable steps for some learners?
How does the design of the study allow for a variety of student abilities and learning styles?
Will the transferability of skills and knowledge be made explicit?

### Thinking about Technology and Learner Success:

What tools would allow students to set goals and self-organize?
How can technology be used to model or enhance the development of life skills?
How will technology be used meet the needs of all students?
Where can technology be used to provide students with multiple means of representation? Expression? Engagement?
How might technology share the manageable steps of a large study?

---

<table>
<thead>
<tr>
<th>Learner Success</th>
<th>Beginning</th>
<th>Developing</th>
<th>Accomplished</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>The teacher tells students how to organize and manage their time and materials.</td>
<td>The teacher sets project management goals and allows students to self-monitor within that framework.</td>
<td>The study provides opportunities for students to set their own project management goals.</td>
</tr>
<tr>
<td></td>
<td>The study provides little opportunity for teamwork.</td>
<td>The study provides few opportunities for students to determine roles, facilitate discussions, and resolve conflict.</td>
<td>The study provides opportunities for students to determine roles, facilitate discussions, and resolve conflict.</td>
</tr>
<tr>
<td></td>
<td>The study has 'one size fits all' design and does not conform to individual learner needs.</td>
<td>The design of the study makes some accommodations for different learning needs.</td>
<td>The design of the study allows for all learners to find success through the three elements of the Universal Design for Learning framework: students are provided with multiple means of representation, expression and engagement.</td>
</tr>
</tbody>
</table>
The final element of strong, inquiry-based learning involves creating space in the learning for students to consider their citizenship activities in the communities they participate in, be it their classroom, school, local community, city, country or beyond. In designing the learning goals and tasks for students, teachers might consider how to extend the learning beyond students developing information, skills and understanding into places where students can consider the results or impacts of their understanding on the people and environments around them. As a further extension, students might be invited to develop and implement action strategies, solutions or awareness-building activities as part of or in response to their findings.

An example of a way to design learning in a way that extends beyond merely information about a topic is Apple's Challenge Based Learning. Challenge Based Learning centers around students collaboratively engaging in a real world problem or issue leading to the design of a solution or action that they can then implement in their local community. Information on Challenge Based Learning can be found at: [http://ali.apple.com/cbl/](http://ali.apple.com/cbl/).

This emphasis on ethical citizenship can be also extended to their experiences as digital citizens in the online world they often inhabit. As part of a rich, 21st Century education, students need to be developing the critical skills of information literacy, visual literacy and media literacy. Developing and reinforcing the ethical use of digital material such as music, images, video and text should be embedded into the design of a study. Additionally, teachers might also consider how students can consider the impact of their online behaviours and begin establishing their own ‘digital footprint’ by sharing work through digital portfolios, blogging and creating wikis.
Guiding Questions for Ethical Citizenship:

How will the study allow students to reflect on their own values, beliefs and opinions on the topic?
Are there places where connections can be made to larger social or environmental issues?
Are there opportunities for students to enact a solution or action plan about the issue?

Thinking about Technology and Ethical Citizenship:

How will the task reinforce critical and ethical uses of information and media?
Will elements of thoughtful digital citizenship be embedded into the study?
How might technology support student reflection about their opinions or values about the topic?
What tools might allow students to share their thoughts?
Resources Used:


## Implementing Inquiry Rubric (2011)

<table>
<thead>
<tr>
<th>Authenticity</th>
<th>Beginning</th>
<th>Developing</th>
<th>Accomplished</th>
</tr>
</thead>
<tbody>
<tr>
<td>The inquiry study originates with and only meets programs of study expectations.</td>
<td>The inquiry study originates with the program of studies but provides some opportunities to extend beyond curriculum expectations.</td>
<td>The inquiry study originates with a generative topic, problem, or exploration that engages the students emotionally and intellectually while rooted in the program of studies.</td>
<td></td>
</tr>
<tr>
<td>The study/s would not likely be tackled outside a school setting.</td>
<td>Other adults outside the school are intrigued by the study/s and can find ways to contribute to it.</td>
<td>An adult at work or in the community might actually tackle the question, problem or exploration posed by the study/s. It is deeply connected to life and work beyond the school.</td>
<td></td>
</tr>
<tr>
<td>Students are required to follow clearly defined approaches to teacher-generated criteria.</td>
<td>Students are offered a menu of approaches in order to meet specific learning outcomes.</td>
<td>The study is structured around methods of inquiry and ways of thinking that are central to the disciplines that underpin the topic, problem or exploration.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Deep Understanding</th>
<th>Beginning</th>
<th>Developing</th>
<th>Accomplished</th>
</tr>
</thead>
<tbody>
<tr>
<td>The inquiry study provides for the acquisition of known factual information.</td>
<td>The inquiry study facilitates the acquisition and application of a broader understanding.</td>
<td>The inquiry study leads students to build deep knowledge structured around clearly stated ‘big ideas’ or controversies central to the topic.</td>
<td></td>
</tr>
</tbody>
</table>
| The inquiry study encourages an uncritical approach to memorizing and repeating facts or applying pre-determined algorithms. Students may lack understanding of what they are memorizing and why. | With support, students can be critical or skeptical about what they thinking, know, hear, read and take to be disciplinary content. | The inquiry study embeds healthy critical and skeptical thinking habits of mind including:  
  - evidence (how do we know what we know?)  
  - viewpoint (who is speaking?)  
  - pattern and connection (what causes what?)  
  - supposition (how might things have been different?)  
  - why it matters (who cares?) |
| Overarching learning goals are absent or integrated once during the study. | Students are given multiple opportunities to develop improved understanding of the overarching learning goals for the study or study. | Students are given multiple and varied opportunities to develop improved understanding of learning goals that are connected to larger learning goals for the term or year. |
### Assessment

<table>
<thead>
<tr>
<th>Beginning</th>
<th>Developing</th>
<th>Accomplished</th>
</tr>
</thead>
<tbody>
<tr>
<td>All assessment is done at the end of the study.</td>
<td>Ongoing assessment is conducted on an informal basis and evaluation is conducted at logical midpoints in the process. Assessment is used in a limited way in guiding teacher’s instructional planning.</td>
<td>Ongoing assessment is woven into the design of the inquiry study providing timely, descriptive feedback and utilizes a range of methods, including peer and self-evaluation. Assessment guides student learning and teacher’s instructional planning.</td>
</tr>
<tr>
<td>The study provides no opportunities for students to reflect on their learning. There are few criteria to guide the students’ learning. There is little or no evidence of goal setting.</td>
<td>The study provides opportunities for students to reflect on their learning using clear criteria established by the teacher. Teachers help students set learning goals, establish next steps and develop effective learning strategies.</td>
<td>The study provides opportunities for students to reflect on their learning using clear criteria that they have helped to set. The students use these reflections to set learning goals, establish next steps and develop effective learning strategies.</td>
</tr>
<tr>
<td>Assessment is mainly focused on factual, surface knowledge or the presentation of the knowledge.</td>
<td>Assessment is focused on assessing student understanding of foundational concepts.</td>
<td>Assessment is used to improve and refine student understanding of the foundational concepts or ways of thinking central to the topic.</td>
</tr>
</tbody>
</table>

### Technology

<table>
<thead>
<tr>
<th>Beginning</th>
<th>Developing</th>
<th>Accomplished</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technology is used for the sake of using technology, not because it will enhance the inquiry. The study is built around the technology used.</td>
<td>Technology has relevance to the inquiry. Students have choice into which technology is utilized.</td>
<td>Technology is used in a purposeful manner rooted in disciplined ways of thinking and doing. The nature of the work determines the appropriate technology being used.</td>
</tr>
<tr>
<td>The major focus is on developing skill and fluency with software applications.</td>
<td>The study uses technology to conduct research, share information, make decisions, solve problems, create meaning, test theories and communicate, mainly inside the classroom.</td>
<td>The study requires students to conduct research, share information, make decisions, solve problems, create meaning, test theories and communicate with various audiences inside and outside the classroom.</td>
</tr>
<tr>
<td>The ongoing inquiry study is not available online.</td>
<td>Students have ongoing, online access to the study as it develops.</td>
<td>Students, parents and the larger community have ongoing, online access to the study as it develops.</td>
</tr>
<tr>
<td>Connecting with Experts</td>
<td>Beginning</td>
<td>Developing</td>
</tr>
<tr>
<td>--------------------------</td>
<td>-----------</td>
<td>------------</td>
</tr>
<tr>
<td>Students hear or read about relevant information only from the teacher, or resources provided by the teacher.</td>
<td>The study involves speakers or interviews with experts outside the classroom. (e.g. one-shot visits, presentations by experts)</td>
<td>The study provides opportunities for students to collaborate with relevant experts in a variety of situations. Students use experts (or expert work) as mentors (or examples) for their own work.</td>
</tr>
<tr>
<td>The study is designed by the teacher(s) in isolation (without expert input).</td>
<td>The study is designed by the teacher in consultation with an expert regarding the topic of inquiry (which may include reading a relevant book or accessing current data on the topic).</td>
<td>The study is designed and implemented by the teacher in collaboration with an expert who provides ongoing feedback to teachers and students. (Feedback may occur in the form of rubric criteria based on expert work).</td>
</tr>
<tr>
<td>The study requires students to communicate what they are learning with a presentation to teacher audience (i.e. handing in as an assignment).</td>
<td>The study requires students to communicate what they are learning in a presentation to the classroom audience.</td>
<td>The study requires students to communicate what they are learning with a variety of audiences through presentation or exhibition.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Performances of Learning</th>
<th>Beginning</th>
<th>Developing</th>
<th>Accomplished</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students work in isolation with few opportunities to discuss their work.</td>
<td>The study provides opportunities for students to share ideas with others. Discussion is often related to the tasks (i.e digitalstory) rather than the foundational concepts.</td>
<td>The study creates a knowledge-building environment where students support, challenge, and improve each other’s ideas with the goal of deepening the collective understanding of the topic.</td>
<td></td>
</tr>
<tr>
<td>The study dictates the form of expression that the students use. Students have little opportunity to reflect on how the selected medium enhances their message or understanding.</td>
<td>Students have limited opportunities to choose forms of expression and to reflect on what media would best communicate their message or understanding.</td>
<td>The study provides opportunities for students to choose forms of expression appropriate to the study and to reflect on their choices.</td>
<td></td>
</tr>
<tr>
<td>The study requires students to rehearse and reproduce surface knowledge and skills.</td>
<td>The study invites students to demonstrate understanding of foundational knowledge and skills through challenging performance tasks</td>
<td>The study deepens foundational knowledge and skills by inviting students to apply understanding in novel situations, problems or cases that increase in complexity.</td>
<td></td>
</tr>
<tr>
<td>Learner Success</td>
<td>Beginning</td>
<td>Developing</td>
<td>Accomplished</td>
</tr>
<tr>
<td>----------------</td>
<td>---------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------</td>
</tr>
<tr>
<td></td>
<td>The teacher tells students how to organize and manage their time and materials.</td>
<td>The teacher sets project management goals and allows students to self-monitor within that framework.</td>
<td>The study provides opportunities for students to set their own project management goals.</td>
</tr>
<tr>
<td></td>
<td>The study provides little opportunity for teamwork.</td>
<td>The study provides few opportunities for students to determine roles, facilitate discussions, and resolve conflict.</td>
<td>The study provides opportunities for students to determine roles, facilitate discussions, and resolve conflict.</td>
</tr>
<tr>
<td></td>
<td>The study has 'one size fits all' design and does not conform to individual learner needs.</td>
<td>The design of the study makes some accommodations for different learning needs.</td>
<td>The design of the study allows for all learners to find success through the three elements of the Universal Design for Learning framework: students are provided with multiple means of representation, expression and engagement.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ethical Citizenship</th>
<th>Beginning</th>
<th>Developing</th>
<th>Accomplished</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>The study only requires students to adhere to clear rules of behavior that govern the way they interact with and treat one another</td>
<td>The study requires students to help determine standards of behavior to govern the way they interact with and treat one another.</td>
<td>The study provides opportunities for students to develop a deeper understanding of themselves, each other, and the way they interact with and treat one another.</td>
</tr>
<tr>
<td></td>
<td>The study requires students to learn about people around the world and/or the natural world.</td>
<td>The study requires students to consider the impact of their understandings and actions on people in their local and global communities and/or the natural world.</td>
<td>The study provides opportunities for students to interact with and care about the impact of their understanding and actions on people in their local and global communities and/or the natural world. Students are also offered the opportunities to change the own behaviors or impact the behaviors of others.</td>
</tr>
<tr>
<td></td>
<td>The study does not require students to consider habits of digital citizenship.</td>
<td>The study provides limited opportunity for students to consider habits of digital citizenship.</td>
<td>Digital citizenship habits are embedded into the study, including the critical and ethical use of images, text, information, sounds and video as well as encouraging students to consider their own digital footprint.</td>
</tr>
</tbody>
</table>