



WHITE PAPER SERIES

INCORPORATE INQUIRY INTO TEACHING & LEARNING:
MAKING QUESTIONS COUNT





Inquiry is an approach to teaching and learning involving several important activities, many of which center on questioning in one way or another. Students are asked to generate their own questions, investigate multiple sources of information, think critically to clarify ideas or generate new ones, discuss their new ideas with others, and reflect on their initial questions and subsequent conclusions. Teachers ask questions to help students connect to prior knowledge, to prompt thinking, to help students clarify thinking, and to guide learning. Inquiry helps students understand the cyclical nature of learning by making the process visible to students in a clear and direct way.

Inquiry helps students construct the understanding necessary to produce deeper learning, and there is as much value in experiences that do not go as planned as the ones that do. Teaching in this way is challenging, and implementing an inquiry approach can seem intimidating compared to the typical manner in which a teacher may be used to planning lessons, managing students, and directing the learning process.

This white paper focuses on questioning as it relates to teaching through inquiry. It examines the kinds of questions teachers can ask to support learning in an inquiry-based lesson or classroom, and how these questions can drive learning that is student-centered and self-directed.

“OH THE THINKS YOU CAN THINK
IF ONLY YOU TRY”



In the popular children’s book *Oh the Thinks You Can Think*, Dr. Seuss captured the importance of questioning. When students are involved in learning through inquiry, they are encouraged to explore questions that will lead to interesting

ideas and deeper understanding about how the world works.

According to Michael Wesch, a leader in the field of media literacy, “...good questions are the driving force of critical and creative thinking and therefore, one of the best indicators of significant learning. Good questions are those that ask students to challenge their taken-for-granted assumptions and see their own underlying biases. Oftentimes the answer to a good question is irrelevant—the question is an insight in itself. The only answer to the best question is another good question.”¹

¹ M. Wesch. 2008. A portal to media literacy. University of Manitoba.



BEGINNING TO IMPLEMENT INQUIRY

In an inquiry-based classroom, both teachers and students have a role in creating and asking questions. Lessons might begin with the teacher asking questions to help students connect with what they already know and to motivate them to bring their own questions to the surface. The teacher's role is to facilitate, rather than direct, student learning by becoming a thought partner. Teacher questions are the core of providing rich experiences, prompting thinking, and advancing content-related questions by students. Teachers can further move thinking forward by responding to students' discoveries with probing questions that help students to clarify, refine, and dig deeper throughout the learning process.

To begin an inquiry-based lesson, a teacher may ask, "Did you ever wonder why gum gets smaller when you chew it?" The purpose of the prompt is to stimulate student interest in the topic. Students are then in a position to generate their own questions about gum that can be answered through their investigations.²

At the start of a lesson, teachers implement the questioning process by asking, and helping students generate, two types of questions:

- 1. Essential Questions**—enable students to learn and then apply their knowledge to wider circumstances. For example, a Social Studies or History teacher using inquiry to explore the Civil War may ask the following essential question: How could political issues or ideas become more important than family loyalties? Essential questions share several characteristics, including:
 - ✓ Relevance to the learner
 - ✓ Open-ended and higher-order (no right or wrong answer)
 - ✓ Answers are not already known
 - ✓ Multiple possible answers
 - ✓ Cannot be answered without careful research; i.e., answers have to be more than simple facts
 - ✓ Able to be researched given available resources³
- 2. Foundation Questions**—are generated by the essential question and are often created through student brainstorming. They are used to guide research aimed at answering the essential question. Examples of these questions include:
 - ✓ Relevance to the learner
 - ✓ Open-ended and higher-order (no right or wrong answer)
 - ✓ Answers are not already known
 - ✓ Multiple possible answers
 - ✓ Cannot be answered without careful research (have to be more than simple facts)
 - ✓ Able to be researched given available resources⁴

² North Dakota Teaching with Technology Initiative. 2002. Teaching and learning strategies: inquiry-based learning. www.ndwt.org/Blackboard/P2SST2inqu.htm

³ Jackson, Sue. 2013. Good questions for inquiry-based projects. www.scholastic.ca/education/teaching_tip/includes/inc_march2013.html

⁴ North Dakota Teaching with Technology Initiative. 2002. Teaching and learning strategies: inquiry-based learning. www.ndwt.org/Blackboard/P2SST2inqu.htm

“I AM NOT AFRAID OF STORMS FOR I AM LEARNING HOW TO SAIL MY SHIP”



As expressed so aptly by the character Amy in *Little Women*, teachers can allay their initial concerns (or fears) about inquiry by learning more about the process. They might take the first step in implementing an inquiry approach by learning how to phrase everyday questions to ignite students’ thinking and curiosity about ideas and the connections between them. For example, instead of asking closed questions such as “What answer did you get for _____?” or “What is _____?”, teachers can adapt questions to make them more open and engaging, like the ones shown in the chart below:

GRADES K-3	GRADES 4-6	GRADES 7-9	GRADES 10-12
What makes a good friend?	What makes a fair punishment?	How do you know if a law is just?	How do we define “leadership”? What makes a “good” leader?
If you could change the town we live in, how would you make it better?	How could you invent a better city?	How is a hero different from a celebrity?	What are “safe” levels of pollutants? How is that determined?
How do the seasons affect what we eat and what we do?	How is water and air quality affected by human activities?	How might humans live in space?	How can the freezing of water be modeled to represent the forces of attraction and repulsion?

Source: Adapted from www.questioning.org/mar05/essential.pdf

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To answer these questions, students gather and process information by inferring, drawing conclusions, comparing and contrasting, explaining, and then applying their understanding to create new ideas. By using open questions to begin students’ thinking, teachers provide them with a model for asking their own questions related to the subject and generating new thoughts, ideas, and theories.

Examples of questions that encourage thinking and reasoning at each stage of the inquiry process include the following:

<p>BEGINNING AN INQUIRY</p>	<p>What do you already know that may be useful here? What sort of diagram might be helpful? How can you simplify this problem? What is known and what is unknown? What assumptions might we make?</p>
<p>PROGRESSING WITH AN INQUIRY</p>	<p>Where have you seen something like this before? What would happen if we changed this... to this...? What hypotheses can you form? What counter examples can you think of? What mistakes have we made? What might be a different way of doing this?</p>
<p>INTERPRETING & EVALUATING THE RESULTS OF AN INQUIRY</p>	<p>How can you best display your data? What patterns do you see in your data? What reasons might there be for these patterns? How can you be 100% sure that this is true? What do you think of (another student’s) argument?</p>
<p>COMMUNICATING CONCLUSIONS & REFLECTING</p>	<p>What method did you use? What other methods have you considered? Which of your methods was the best? Why? Where have you seen a problem like this before? What helpful strategies have you learned for next time?</p>

Source: *Asking Questions that Encourage Inquiry-Based Learning*. Centre for Research in Mathematics Education University of Nottingham. 2010.

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Here are specific examples for approaching inquiry-based questioning in the classroom:



1. The teacher focuses student conversation and discussion around a central topic. The whole class or groups of students work together to develop one or more essential questions for everyone to research. This approach allows students a voice in the direction of the project without making it difficult for the teacher to manage.

For example, the class chooses to investigate the concept of leadership through a project designed to answer the essential question: How do we define leadership? Students are asked to choose three people from three different time periods who were considered to be leaders. Their assignment is to compare and contrast their lives and leadership styles, leading to students' own definitions of leadership based on what they learn.

2. In this more comprehensive implementation of inquiry-based learning, the teacher poses a problem and allows each individual student or small group to develop their own essential questions. The teacher provides individual and group feedback as needed while the students choose the direction of the project, the process, and the product they will create.

For example, the teacher may state the problem: The water in our local ponds is becoming polluted. Students may then posit such questions as: What might be causing this pollution? How might we go about reducing the pollution and improving the water quality? What could be the impact on our community if the pollution continues?

IN CONCLUSION...

Studies consistently show that student attitudes, achievement, and levels of motivation to pursue learning on their own increase when they are engaged in generating their own questions as part of inquiry-based activities. For example, a University of Wisconsin study found that larger improvements in student achievement in English classrooms were significantly related to greater use of authentic questions.⁵ A large-scale study involving more than 1,400 students in California, Florida, New York, Texas, and Wisconsin found that discussion-based inquiry approaches were significantly related to improved student performance. Further analysis concluded that these approaches were effective across a range of situations and for students of varying levels of academic ability.⁶

⁵ Nystrand, Martin and Adam Gamoran. 1991. Instructional discourse, student engagement, and literature achievement. *Research in the Teaching of English* 25: 261-290.

⁶ Applebee, Arthur N., Judith A. Langer, Martin Nystrand and Adam Gamoran. 2003. Discussion-Based Approaches to Developing Understanding: Classroom Instruction and Student Performance in Middle and High School English. *American Educational Research Journal* 40 (3): 685-730.

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