i.e. information for educators

Inquiry as an Instructional Approach

By Anne McKeough, Ph.D.

> **"It must be remembered that the purpose of education is not to fill the minds of students with facts … it is to teach them to think."**
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> *– Robert M. Hutchins, educator and writer, 1899-1977*

Inquiry has long been a critical cognitive and creative process for scientists, researchers, artists, entrepreneurs, and thinkers across many domains. It's essential in any process that requires innovative thinking and sustained creative work to build on ideas (Scardamalia and Bereiter, 2003).

Inquiry as an approach to learning recognizes and supports children's natural interest in learning. Research has shown that even very young children develop conceptual understanding by wondering, asking questions, and developing naive theories about their environments (e.g., Carey and Smith, 1993; Kuhn, 2000; Wellman and Gelman, 1998).

To incorporate an Inquiry approach is to build on the innate curiosity of the very young, nurturing and supporting their developmental trajectory toward metacognitive skills of proficient knowledge creation. Yet it has not always played a central role in schools.

Powerful Learning Environments

Only a few educational contexts offer students powerful learning environments in which the focus is on knowledge-building. These classrooms are places where children inquire by asking questions, seeking resources, sharing information, and formulating theories. Students develop skills for lifelong learning and cultivate responsibility because they become decision makers in their learning.

For instance, students decide what interesting questions they will investigate and where they will go for information. They are responsible for formulating problems, determining a strategy to help them investigate, and deciding how to present their findings to others. When an Inquiry approach occurs in a collaborative context, teachers build not just individual knowledge but also children's "collective expertise" (Scardamalia, 2000). The sharing of this expertise helps cultivate effective communication with others.

Within powerful learning environments, students become more experienced with sustained, creative work with ideas. This work goes beyond brainstorming to challenge students to think as innovators do: to work with ideas, test them, revise them, make them useful, and develop them into theories (Scardamalia and Bereiter, 2003).

Students enjoy developing ideas through Inquiry. Scardamalia and Bereiter (2003) have described knowledge-building classrooms as places where children gain great satisfaction in working with ideas. This does not exclude hands-on activities for young students. Rather, concrete activities have a purpose beyond simple project work or variable testing.

For example, in a knowledge-building class, building a paper airplane is not only a simple exercise in following instructions; it also helps students understand the physics behind flight, which in turn may lead to variable testing. It also leads to the investigation of other big ideas, such as hydroplaning, or how propellers work (Scardamalia and Bereiter, 2003).

Lastly, the meaningful work accomplished through discourse in this socio-cognitive environment cultivates the development of self and group monitoring and assessment. Given the responsibility

of participating in their own knowledge-building and learning over time, students come to understand, with guidance, that they must participate in and are accountable for real work. They learn that this participation and accountability is also collective.

An Inquiry Study

A recent study investigated the effects of Inquiry as an instructional approach regarding children's views on learning and the construction of knowledge. The primary aim was to develop a powerful learning environment while simultaneously expanding the theoretical understanding of how children conceptualize learning. Specifically, researchers sought to explore the effects of Inquiry (as an instructional approach within the language arts curriculum) on children's views of learning and the construction of knowledge.

Participants, comprised of 28 boys and 24 girls, were drawn from three Grade 1 classrooms within two schools located in a Canadian town of approximately 10,000 residents. Most students came from middle-income homes. One school served children living in town and on farms, while the other drew its population from the town itself. All participating teachers had at least five years of experience.

A structured Inquiry interview protocol was developed to target the five competency categories documented as outcomes of an Inquiry approach to instruction (e.g., Murray, Shea, and Shea, 2004; Scardamalia and Bereiter, 2003):

- Purposeful questioning
- Multiple sources of information
- Knowledge, ideas, and theories as mental objects
- Recognition of peer knowledge and community of learners
- Knowledge of the investigative process

A scoring rubric was established including three levels of competence on these issues, with three as the highest level. Students were interviewed before beginning Inquiry instruction using an Inquiry Interview protocol. After using Inquiry, the students were interviewed again using the same protocol. (See the chart on page 5.)

Teachers used the foundational program from *Imagine It!* as the curriculum. *Imagine It!* is a core Pre-K–6 reading and language arts program from SRA/McGraw-Hill that includes a strong Inquiry strand with built-in tools to promote curiosity, investigation, and higher-order thinking. Materials included readings on Inquiry unit topics (i.e., narrative and expository), providing teachers and researchers with four overarching aims of Inquiry to anchor their teachings.

1. Engage students in productive knowledge work. (Help them take a high degree of responsibility for knowledge-building, articulate what they already know and what they want to find out, make decisions about how to investigate, gather appropriate resources, and take risks by sharing questions, conjectures, and theories.)

2. Create a knowledge-building community. (Create opportunities for collaboration, model respect for others' ideas, help students see one another as knowledge builders, and widen the learning community to include others beyond the classroom walls.)

3. Help students monitor knowledge advances. (Judge how well their inquiries were going, apply strategies when stuck, and reflect on knowledge growth.)

4. Aid students in communicating ways to reflect deep understanding of the concepts and ideas they've explored. (Share information and ideas in ways that allow others in the learning community to understand and find ways to circumvent limitations, such as presenting information orally and using pictures.)

Just as the aims of Inquiry provided teachers with an overall framework to guide their students' work, a general format provided an overall structure for the sequence of learning activities within each unit. For example, Inquiry units began with a kick-off event to spark students' interest, prompt them to access and share background knowledge, help them identify areas worth investigating, and trigger curiosity and questions.

Teachers recorded children's ongoing learning with a bulletin board (called a Concept/Question Board), listing questions on one side and ideas and theories on the other. Teachers helped students record their questions, add information as they found it, and articulate and revise theories.

Teachers also designed learning activities day to day to reflect the twists and turns of students' interests and their growing knowledge of the topic, as well as to incorporate curricular objectives. As students' knowledge grew, teachers sought ways and means for them to showcase what they had learned. Teachers also worked toward involving students to an even

greater degree in making decisions about how to share their knowledge, while seeking to increasingly take the role of facilitator rather than director. Finally, teachers worked with the children to create a suitable culmination and celebration of their Inquiry accomplishments.

Inquiry Study Results

The study found teachers and researchers were successful in creating a powerful learning environment to support knowledge-building through Inquiry instruction. The learning environment engaged students in authentic problems, helped them learn and work together collaboratively, and enabled them to monitor and take increasingly more responsibility for their learning.

Students were again given the Inquiry Interview, and all the competency categories were rated within the three-level rubric. That students responded to the Inquiry learning environments in some positive degree was evident in the statistical analyses conducted on the pre- and post-Inquiry instruction interviews.

The analysis showed that the Grade 1 students improved their knowledge of investigative processes. Children of this age must master the process of learning how to learn: how to formulate a question, find information, revise questions based on new knowledge, and share improved knowledge. These skills are the cornerstones of Inquiry.

All the groups' capacity to see knowledge, ideas, and theories as mental objects increased. Their understanding of the role played by others in their community of leaders also expanded.

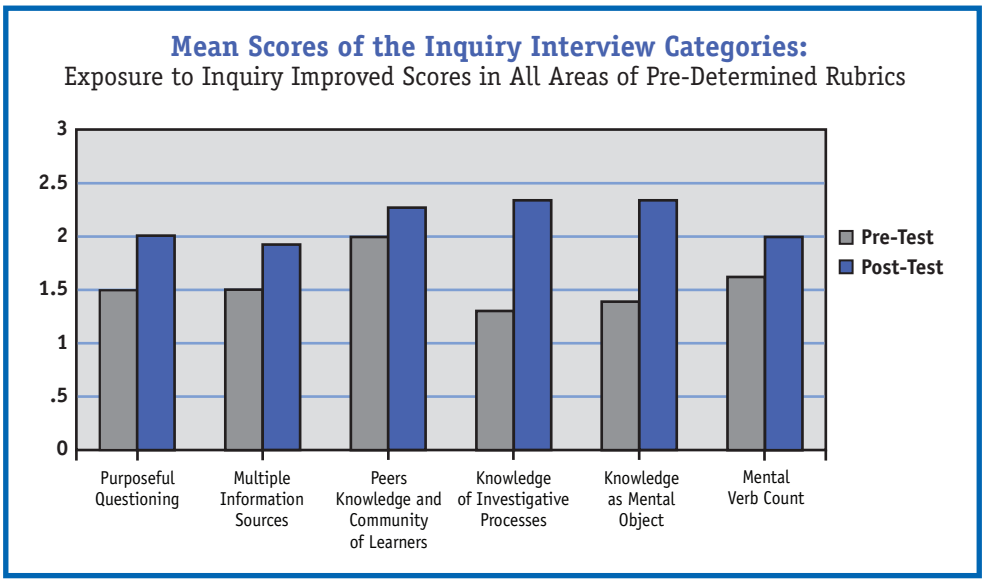
By focusing on the foundational program within the *Imagine It!* program, teachers successfully created powerful learning environments. Specifically, when supporting students' engagement in productive knowledge work, they ensured children contemplated authentic problems by allowing them to set personally meaningful research directions and decide how to carry out investigations.

These teaching strategies also allowed students to assume a high degree of responsibility for knowledge-building. Teachers assisted in creating a knowledge-building community by helping them use the Concept/Question Board; model collaboration and respect for others as knowledge builders; invite parents/guardians, other classes, and community members into the investigative process; and provide opportunities to share their knowledge with others in ways that took into account their emerging reading and writing skills. Additionally, teachers helped students monitor knowledge advances by helping them reflect on how their understanding was changing and how their ideas were improving.

In summary, by taking an Inquiry approach to instruction and creating powerful learning environments through the aims of Inquiry, students will understand the investigative process, see knowledge, ideas, and theories as mental objects, and recognize the importance of peer knowledge and their community of learners.

Inquiry is not, however, a lock-step process; there are multiple pathways in knowledge-building. Young children might begin their wonderings with a personal story, a theory, an idea, or even an opinion. After discussions with others, all of these beginnings can

Student Scores on Rubrics Assessment



lead to the formulation of a researchable question — a question that keenly needs to be answered — and may well lead to other in-depth questions. Within an Inquiry classroom, even young children can come to understand knowing as open ended, changeable, and improvable. They will come to view learning as multiple sourced and community based. They will come to view ideas and theories as things to be evaluated — infinite yet within their grasp.

Choosing Inquiry Instruction

Engaging in Inquiry instruction requires a different approach to planning for teachers. In a traditional approach to a unit of study in language arts, many aspects of classroom learning activities (e.g. unit objectives, instructional activities, resources, and assessment procedures) are pre-selected by the teacher or dictated by published teacher's guides.

With Inquiry, however, teachers share control of learning activities with students. Students actively participate in deciding what aspects of a topic are worthy of further investigation, how to go about building their knowledge, and how they will share what they have learned with others.

Imagine It! Works

Teachers and researchers used the foundational program from *Imagine It!* in the aforementioned Inquiry study. This reading and language arts program from SRA/McGraw-Hill for Grades Pre-K–6 builds critical thinkers through Inquiry-based learning. Each unit begins with student-led discussions to prompt questions and areas of investigation about the unit's theme. Each unit also includes built-in tools to promote curiosity, investigation, and higher-order thinking.

Imagine It! meets the requirements of No Child Left Behind as a research-based program. It is the result of 45 years of research and field study and contains all the elements recommended by the National Reading Panel: instruction in phonological and phonemic awareness, explicit phonics, fluency, vocabulary, and comprehension, as well as robust instruction in writing.

Imagine It! includes:

- A comprehensive design giving students complete depth and breadth of knowledge in the concepts they're learning
- Tools and support for teachers, including differentiated instruction components
- A focus on Response to Intervention (RtI)
- All daily reading, language arts, and writing curriculum requirements
- Abundant curriculum links to science and social studies
- Strong assessment components
- Easy-to-use technology to fully integrate learning

To learn more about the program, visit ImagineItReading.com.

About the Author

Anne McKeough is a professor in the Division of Applied Psychology at The University of Calgary and teaches graduate courses in the Developmental and School Psychology Programs and undergraduate courses in the Teacher Preparation Program. She holds a Ph.D. in Applied Cognitive Science from the Ontario Institute for Studies in Education, University of Toronto. Her research is in the areas of cognitive development and developmentally based instruction, focusing on children's and adolescents' use of narrative meaning-making in scholastic, social, and personal contexts. McKeough has authored numerous book chapters and articles, and has edited four volumes, Toward the Practice of Theory Based Instruction, Teaching for Transfer, Schools in Transition, *and* Literacy Development: A Global View. *Additionally, she is a co-author of* Imagine It! *and* Kaleidoscope, *distributed by SRA/McGraw-Hill. She has been recognized for her research, teaching, and mentorship locally and nationally.*

Inquiry Interviews Scoring Rubrics			
Competency Category	**Scoring Criteria**		
	3 points	**2 points**	**1 point**
Purposeful Questioning *Q: When do you ask questions?*	Questions are directed toward knowledge-building. *A: When I want to know something.*	Questions reflect procedural knowledge so that the child demonstrates an understanding of the social skills related to asking questions. *A: When the other kids are done, and they're done talking, then I put my hand up.*	Questions are not necessarily motivated by meaning or anchored in any other understanding. *A: Right after stories are over.* *A: After recess.*
Multiple Sources of Information *Q: Who do you ask questions to?*	Extends answers to include general knowledge sources. *A: I'd watch a movie or read a book.*	Answers are multiple, using familiar people. *A: The people at my table and Mrs. Herriot.*	Answers focus on one familiar person. *A: My mom.* *Q: Anyone else?* *A: No.*
Knowledge, Ideas, and Theories as Mental Objects *Q1: What is an idea?* *Q2: What is a theory?*	Views knowledge/ ideas as a mental object in that it is a thing one thinks. Able to elaborate on initial statement. *A1: Something you think you don't know for sure.* *A2: It's a question. It's an unanswered question and we don't know if it's right or wrong.*	Views knowledge/ ideas as a mental object in that it is a thing that one thinks. Unable to elaborate on initial statement. *A1: It's like if I didn't know how to do stuff and someone had an idea and he's telling it.* *A2: A theory is a thing you think it is.*	Unable to answer question. *A1: I forget.* *A2: I don't know.*
Recognition of Peer Knowledge and Community of Learners *Q: Can your classmates help you to learn things?*	Answers reflect sharing knowledge from a secondary source, discussion, or offering emotional support. *A: Yes. Because they help you to figure things out. They tell you things that you don't know. And they can help you feel better.*	Specific concrete examples are given. No evidence of abstraction. *A: Yes. Like I asked my friend if it has two o's in it because I don't hear two o's, and he said yes.*	Answers that classmates cannot help him or her to learn in class. *A: No. Because Mrs. Smith said that you're not allowed to look at other people's stuff.*
Mental Verb Count *Example: Using words like* think, know, plan, guess, *or* wonder	Count range: 11-18	Count range: 3-10	Count range: 0-2
Knowledge of the Investigative Process *Q1: How do you know if your idea is right or wrong?* *Q2: If your idea turns out to be right, what would you do?* a. Question-asking b. Information-finding c. Question revision d. Knowledge-sharing or application	Answers reflect a minimum of either a and b or c and d. *A1: Sometimes my friends say it is wrong, but they don't really research it.* *A2: I would start telling people about it.*	Answers reflect knowledge of a and b.	Answers are not reflective of a, b, c, or d. *A1: I don't know.* *A2: Get happy.*

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