Pittsfield Middle High School

Authentic Assessment/IBL Team

Working Group Meeting

October 25, 2012
11:00am – 6:00pm

CSSR
The Center for Secondary School Redesign

newvista
Designs for Learning

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EXPECTED OUTCOMES: By the end of the session we will have…

- Debriefed the PAR Board visit and Late Start Wednesday presentation
- Begun creation of a Common Language Glossary
- Deepened our understanding of using essential questions when planning and teaching lessons
- Practiced using a Text-Based Discussion protocol

11:00 – 11:30 **Opening Activities**

a) Teacher-led activator (Brian)
b) Review of agenda
c) Review of norms

11:30 – 11:45 **Team-Led Activity Debrief**

11:45 –12:15 **PAR Board Debrief**

a) Review action plan developed in August
b) Develop work-specific goals for each section of the June 2013 outcomes

12:15 –1:00 **Late Start Wednesday Review (Working Lunch)**

- Paul
- Bill
- Upcoming

1:00 – 2:00 **IBL SMART Goal 1: Creating a Common Language/Glossary**

- Use Chalk Talk Protocol to identify what IBL words and concepts will be important to use and define when working with students, the faculty, and the larger Pittsfield community

2:00 – 2:15 **BREAK**

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2:15 – 3:15 **The Art of Questioning - Text-Based Discussion**

- Use Making Meaning Protocol to discuss Chapter 1 of *Make Just One Change: Teach Students to Ask Their Own Questions* by Dan Rothstein and Luz Santana

3:15 – 4:45 **Working Time: Designing a Lesson**

- Use the PMHS Project Design Template to design a lesson that incorporates a question and ends in an authentic assessment

4:45 – 5:45 **Group Presentations**

a) Mini-presentations lesson plans

5:45 – 6:00 **Closing Activities**

a) Journaling
b) Norms Review
c) Driving and Restraining Forces (Force Fields)

SRI SCHOOL REFORM INITIATIVE
A COMMUNITY OF LEARNERS

Chalk Talk

Developed by Hilton Smith, Foxfire Fund; adapted by Marylyn Wentworth.

Chalk Talk is a silent way to reflect, generate ideas, check on learning, develop projects or solve problems. It can be used productively with any group—students, faculty, workshop participants, committees. Because it is done completely in silence, it gives groups a change of pace and encourages thoughtful contemplation. It can be an unforgettable experience. Middle Level students absolutely love it—it's the quietest they'll ever be!

Format

Time: Varies according to need; can be from 5 minutes to an hour.
Materials: Chalk board and chalk or paper roll on the wall and markers.

Process

1. The facilitator explains VERY BRIEFLY that chalk talk is a silent activity. No one may talk at all and anyone may add to the chalk talk with words or graphics as they please. You can comment on other people's ideas simply by drawing a connecting line to the comment. It can also be very effective to say nothing at all except to put finger to lips in a gesture of silence and simply begin with #2.

2. The facilitator writes a relevant question in a circle on the board.
   Sample questions:
   - What did you learn today?
   - So What? or Now What?
   - What do you think about social responsibility and schooling?
   - How can we involve the community in the school, and the school in community?
   - How can we keep the noise level down in this room?
   - What do you want to tell the scheduling committee?
   - What do you know about Croatia?
   - How are decimals used in the world?

3. The facilitator either hands a piece of chalk to everyone, or places many pieces of chalk at the board and hands several pieces to people at random.

4. People write as they feel moved. There are likely to be long silences—that is natural, so allow plenty of wait time before deciding it is over.

5. How the facilitator chooses to interact with the Chalk Talk influences its outcome. The facilitator can stand back and let it unfold or expand thinking by:
   - circling other interesting ideas, thereby inviting comments to broaden
   - writing questions about a participant comment
   - adding his/her own reflections or ideas
   - connecting two interesting ideas/comments together with a line and adding a question mark.

Actively interacting invites participants to do the same kinds of expansions. A Chalk Talk can be an uncomplicated silent reflection or a spirited, but silent, exchange of ideas. It has been known to solve vexing problems, surprise everyone with how much is collectively known about something, get an entire project planned, or give a committee everything it needs to know without any verbal sparring.

6. When it's done, it's done.

7. The Chalk Talk can be considered complete at this point or it can become the basis for a further discussion. Questions to raise with the group might include:
   - What do you notice about what we wrote?
   - What do you wonder about now?
   - What was the Chalk Talk like for you?

The Making Meaning Protocol
Adapted for use With a "Text"

Developed by Daniel Baron.

1. **Getting Started**
   - Participants read the text in silence, making brief notes about aspects of it that they particularly notice.

2. **Describing the Text**
   - The facilitator asks the group, "What do you see?"
   - Group members provide answers without making judgments about the quality of the text or their personal preferences.
   - If an interpretation or judgment emerges, the facilitator asks for the evidence on which it is based.

3. **Asking Questions About the Text**
   - The facilitator asks the group, "What questions does this text raise for you?
   - Group members state any questions they have about the text.
   - The facilitator takes notes.

4. **Speculating about the Meaning/Significance of the Text**
   - The facilitator asks the group, "What is significant about this text?"
   - Participants, based on their reading of the text, construct meaning about the insights, problems or issues that the text seems focused on.

5. **Discussing Implications for Our Work**
   - The facilitator invites everyone to share any thoughts they have about ways this particular text might influence their work as teachers and educators.

6. **Reflecting on the Making Meaning Protocol**
   - The group reflects on the experiences of or reactions to the protocol.

PMHS Project Design Template

ACADEMIC RIGOR

1. What is the essential question addressed by the project? (Ex. How do authors' lives and experiences shape their literary works? How do scientists solve real life problems? When is something art?

2. What 21st century skills will students apply and assimilate through this project? How will students demonstrate these behaviors?

21st CENTURY SKILLS	HOW STUDENTS WILL DEMONSTRATE

3. Which national, state, local standards are addressed by the project? What will be the evidence that students have met the standards?

COMPETENCIES	EVIDENCE/INDICATORS

4. What key course concepts, themes, or inquiry methods are addresses by this project? (Ex. Using the substitution method to solve equations, creative writing, think like a scientist…)

AUTHENTICITY

5. Where in the "**real world**" might one see the problem or question addressed by the project tackled by an adult at work or in the community? (Ex. Local fish and game scientist also study species in our local creek.)

6. How do you know that the problem or question is **meaningful to students**? (Ex. Students are genuinely interested in the advertising techniques they see in popular media. Specific topic choice was also offered.)

7. What type of **audience** might be appropriate for the students' work? (Ex. Industry experts, community decision-makers, parents, other staff members, local service clubs, other students…)

ACTIVE EXPLORATION

8. What **field-based activities** does this project require students to conduct? (Ex. Interview experts, participate in a work-site visit, collect survey data, collect scientific data…)

9. Which of the following **methods and sources** of information are students expected to use in the project? (Check all that apply)
   - o Interviewing
   - o Observing, documenting, and/or surveying
   - o Video or audio-taping
   - o Gathering and reviewing published information
   - o Searching on-line and electronic databases
   - o Creating a symbolic representation (g/g/, model building, map making)
   - o Discussion
   - o Experimentation

APPLIED LEARNING

10. How will students **apply** the knowledge they are learning to a complex or semi-structured problem? What will they actually do? (Ex. Students design a product, organizing an event, produce a CD)

11. Which of the following 21st Century Learning Expectations does the project provide students with the opportunity to develop? (Check all that apply)
   - o Work collaboratively in teams
   - o Effectively communicate ideas and information
   - o Other
   - o Other
   - o Other

ADULT CONNECTIONS

12. Do students have access to at least **one other adult** with expertise relevant to their project who can address questions, provide feedback, etc.?

_____ Yes _____ No _____ Not Sure

13. Does the project offer students the opportunity to develop a broader understanding of the relevant field of work through observing adults during at least on in-depth **work site visit**?

_____ Yes _____ No _____ Not Sure

14. Does at least one adult from the outside the classroom help students develop a sense of the **real world standards** for the type of work arising from their project?

_____ Yes _____ No _____ Not Sure

15. What **roles** will adults outside of the classroom play in this project, and how will students **connect** with these individuals? (Ex. Structural engineers will provide feedback to student teams on bridge design, Teacher contacts will be used.)

ASSESSMENT PRACTICES

16. What are the **criteria** for measuring student growth in each of the following?

- 21st Century Skills
- Standards (State and Common Core)
- Product Creation

17. Are students asked to **review** and/or **help establish** project criteria?

_____ Yes _____ No _____ Not Sure

18. Which of the following methods of **structured self-assessment** of progress are students expected to use? (Check all that apply)

- Journals and work logs
- Conferences with teachers or adult mentors
- Conferences with peers
- Using a rubric or other assessment measure
- Reviewing their progress against a work plan they developed for the project
- Identifying areas where improvement has occurred and where it is needed

19. What types of ongoing feedback will students receive on their work-in-progress from teachers, mentors, and peers?

20. What benchmark deliverables are students expected to complete prior to the final product or outcome? (Ex. Formative assessments such as proposal, work plan, reflection papers, mini-presentations, models)

21. Do students prepare a culminating exhibition, performance, or demonstration at the completion of their project that shows their ability to apply the knowledge and skills they have gained?

_____ Yes _____ No _____ Not Sure

22. What opportunities are students given to conduct individual, small group and whole class **reflections on their learning** and to offer suggestions for future class projects? (Ex: Small group reflection and whole-class debrief held the day after final exhibition.)

ACTION PLANNER FOR 2012-2013
PITTSFIELD MIDDLE HIGH SCHOOL

① ③ ②

WHERE ARE WE NOW (12/11)?	STEPS TO ACCOMPLISH GOAL	WHERE WILL BE IN JUNE '13
• Functioning team with definition of work with enthusiasm and buy-in • Faculty has basic understanding of need to think "outside the box" (some not vested because it is a "it will change" thing, some not open to other options, thought process) • SLC work has begun (used but needs improvement) • Some teachers willing to step into the AA/IBL work—responsibility • Some resistance from students—level of challenge/independence • Middle school has started a cultural change that will progress up through grade levels • Need work on the idea of essential questions (individual, content, et cetera)	• Members of the i3 Team with the support of outside facilitators will provide training to their colleagues in development and implementation • Time during LSW, faculty meetings, possibly department meetings, monthly Thursday i3 meetings?? • All faculty members will have common definitions of authentic assessment, essential questions, et cetera. The Best Practices sub-committee from Community Advisory Council compiled a preliminary "dictionary" that's on the CAC website—possibly use that? Alexandra and students go to all CPTs with the same message (LSW? Department meetings?). • Moderation protocols—there are preliminary rubrics from New York Consortium • Formative assessment to drive PD vis a vis SCL. Training through modeling. Sessions should be interactive—learn by doing. Model the concepts trying to be addressed. • Training for students as well	• Between September and January, all faculty will be trained with the support of already-trained peers in student-centered classroom practices. By June, with the support of already-trained faculty, all teachers will implement at least one student-centered unit in their classroom that culminates with an authentic summative assessment. • The i3 Team will include actively engaged members from ALL CPTs.

IBL SMART Goals as Modified and Accepted During the Summer

IBL SMART Goal 1:
By the end of the 2012-2013 year the i3-IBL Team will have defined, distilled, recorded and informed the PMHS community of the common "language" that describes the inquiry-based learning (IBL) process at PMHS, that is easy to understand, and connects to the work of the varied PMHS professional development teams.

IBL SMART Goal 2:
By the end of the 2012-2013 year the i3-IBL Team will have created a set of materials to describe and record their work that includes project design template, assessment rubrics, POL (Presentations of Learning) and exhibition guidelines, and sample project overviews.

IBL SMART Goal 3:
During the 2012-2013 year members of the i3-IBL Team will expand school-wide awareness of i3-IBL materials, methods, and professional development practices by sharing them with their respective CPT teams at least once a month, while Arnold Clayton and David Stephen will each visit every CPT team a minimum of two times.

IBL SMART Goal 4:
During the 2012-2013 year members of the i3-IBL Team will work to create a framework and materials that describe a process for student Presentations of Learning (POLs) at PMHS and then pilot this process within each of their classrooms at least two times.

IBL SMART Goal 5:
During the 2012-2013 year members of the i3-IBL Team will work to refine a framework and materials that describe the process for the public exhibition of student work at PMHS and then pilot this process in the spring of 2013, engaging 50% of the faculty and 75% of the student body.

PMHS Definitions

INQUIRY-BASED LEARNING

Inquiry-based learning (IBL) is a student-centered and teacher-guided instructional approach that engages students in posing and answering real-world questions. IBL builds on student's natural curiosity so that they learn by investigating ideas alone and with others, explaining the evidence they collect and demonstrating the knowledge and skills they have gained publicly.

IBL complements traditional instruction by providing a vehicle for extending and applying the learning of students in a way that connects with their interests and challenges them to acquire and analyze information, develop and support propositions, provide solutions, and create products that demonstrate their thinking and make their learning visible. The benefits of IBL include the:

- Practice of problem-solving and critical thinking skills
- Deepening of connections to disciplinary content
- Transfer of concepts to new problems and questions
- Development of self-directed learning skills
- Promotion of student ownership, engagement, and interest

STUDENT-CENTERED LEARNING

Student-centered learning holds the student at its center instead of the teacher. As students take on the role of "pro-active learner," they are challenged to become aware of their needs, abilities, interests, and learning styles as the teacher takes on the role of "coach or facilitator" of learning. This classroom teaching method acknowledges student voice as central to the learning experience for every learner.

This is similar to the way athletes learn to play a sport or musicians, an instrument. The teacher acts as a coach, briefly explaining new ideas and skills and then sets up effective learning activities and practice sessions so the students can develop knowledge and proficiency at their own pace. The students are the workers while the teacher coaches them and monitors their progress. Like athletes and musicians the students demonstrate what they have learned in a public performance.

Make Just One Change

Teach Students to Ask Their Own Questions

DAN ROTHSTEIN
LUZ SANTANA

Harvard Education Press
Cambridge, Massachusetts

CHAPTER 1

The Question Formulation Technique

Teaching Multiple Thinking Abilities in One Process

"I learned that when you ask your own questions you can actually learn more."

THE QUESTION FORMULATION TECHNIQUE (QFT) is a step-by-step process designed to facilitate the asking of many questions. But it does more than that—it takes students through a rigorous process in which they think more deeply about their questions, refine them, and prioritize their use. As the students go through the steps of the QFT, they practice, in addition to question formulation, three fundamentally important thinking abilities: divergent thinking, convergent thinking, and metacognition.[1]

In this chapter, we will briefly look at these three thinking abilities and then at their connection to specific steps of the QFT. We will also look at how the QFT is both an *art*—an open process that is continuously shaped by the actions and thoughts of teachers and students—and a *science*—a rigorous, laboratory-tested, scaffolded procedure; a protocol for consistently producing similar, replicable results each time it is deployed.

THREE WISE THINKING ABILITIES

Imagine your students:

- Freely generating new ideas
- Analyzing text

- Synthesizing research
- Making meaning of what they are studying
- Naming what they know and how they can use what they know

In order to do all of the above, they need three distinct thinking abilities:

- **Divergent thinking:** The ability to generate a wide range of ideas and think broadly and creatively
- **Convergent thinking:** The ability to analyze and synthesize information and ideas while moving toward an answer or conclusion
- **Metacognition:** The ability to think about one's own thinking and learning

Each ability on its own is a valuable resource for any student. When put together, their individual potency is multiplied many times over. Let's look for a moment at each one. Then we'll see how they are brought together in the Question Formulation Technique.

Divergent Thinking: Opening the Mind to New Possibilities

Divergent thinking reflects an ability to generate a wide range of ideas, options, hypotheses, and possibilities.[2] It is what your students need to be able to do when they say "I'm stuck" or can't generate ideas about possible research topics or shy away from thinking creatively. They seem to grow less and less comfortable doing divergent thinking the more years they spend in school.

"Creative souls" such as artists, writers, and musicians are respected for their divergent thinking ability, for the way they think out of the box to conjure up unconventional, inventive new ideas. Divergent thinking is almost always seen as a gift rather than an acquired and developed skill. But this view is far from the truth: divergent thinking is a distinct form of higher-order thinking that can be taught to all ages and all students. Research has demonstrated that kindergarteners who practiced divergent thinking showed gains in their abilities, and older students with low academic performance showed an ability to learn divergent thinking and gained greater self-confidence in their overall abilities the more they practiced.[3] When students use divergent thinking, they improve and demonstrate an enhanced ability to generate more ideas and greater flexibility of thought.[4] Perhaps most importantly, the benefits carry forward: students with greater divergent thinking skills show

increased confidence in their ability to handle challenges and handle stress better, and they tend to carry this thinking skill into real-world situations.[5]

Convergent Thinking: Synthesis, Analysis, and Making Meaning

The need to promote divergent thinking is not just as an intellectual aspiration, but also a powerful resource for generating new ideas for business and commerce (think about the creative world of the Web 2.0 and social media). There are, however, concerns that creativity—the expected outcome of divergent thinking—is in decline across the country. *Newsweek* dedicated a cover story in 2010 to the "Creativity Crisis"; the article pointed to school-based programs and researchers who demonstrate that creativity requires *convergent* as well as divergent thinking.[6]

Convergent thinking involves the synthesizing of a range of ideas, allowing students to take a collection of facts and examples and make sense of it all. This type of thinking occurs when a student explains, interprets, summarizes, compares, and contrasts—all forms of intellectual activity aimed at pulling things together.[7]

Genuine creativity, the research suggests, "requires constant shifting, blending pulses of both divergent thinking and convergent thinking, to combine new information with old and forgotten ideas. Highly creative people are very good at marshaling their brains" to tap into both kinds of thinking. For schools, it turns out that programs that succeed at fostering creativity in students actually "alternate maximum divergent thinking with bouts of intense convergent thinking."[8]

Metacognition: Learning to Think About Thinking

Although combining divergent and convergent thinking abilities is a potent resource for your students, we need to add one more ability to the mix—*metacognition*, the ability to think about one's own learning and thinking processes. It is a concept with ancient roots, but has recently been shown to be essential for improving the education of all students. The late Ann Brown, a development psychologist and a prominent researcher of metacognition, noted how successful students naturally raise questions about the material they read, make predictions, reflect on the sense and meaning of the story, and wonder and question further about what is happening. She noticed that students who struggle do not apply these methods as they read. She set out with colleagues, including her husband Joseph Campione, to create a strategy to instill such patterns of thinking in these struggling students.

Her idea was to create a "community of learners" in elementary school classrooms that would emphasize these reflective and inquisitive methods in their studies.[9]

Brown, the first member of her family to attend college, learned to read fluently only when she was thirteen. Acutely aware of the need to know how to learn, she argued that "effective learners operate best when they have insight into their own strengths and weaknesses and access to their own repertoires of strategies for learning."[10] Her work focused on the importance of how metacognition allowed learners to understand what they have learned, name how they have learned it, and consider how they can use it in other situations.

The National Research Council report *How People Learn: Brain, Mind, Experience, and School* recognized metacognition as a key factor in learning, and one that needs to be systematically and deliberately developed in all students.[11] The committee members highlighted the particularly important role that metacognition plays in promoting transfer of learning. Students who are aware of themselves as learners and who can name and monitor their own learning strategies can more easily apply knowledge obtained in one context to another.[12]

Most students do not arrive in the classroom equipped with metacognitive skills, nor do they leave with them at the end of their high school years. The problem persists into higher education; research shows that many college students lack basic metacognitive skills and habits to assess their own understanding of content and material.[13] Limited metacognitive abilities can result in inadequate grasp of content, inefficient use of time and attention, overconfidence in one's knowledge, and few attempts to learn from new or contradictory information.[14]

Metacognition, as the National Research Council argued, needs to be deliberately nurtured, as does the ability to think divergently and convergently.[15] They are three extraordinarily important thinking abilities that may not be evident now in your students, but are within their reach. We are about to show you how all three can be nurtured, developed, and mastered in one concise process.

THE QUESTION FORMULATION TECHNIQUE

The Question Formulation Technique (QFT) offers a process and structure within which students can, in a limited amount of time, develop all three abilities and also

help them deepen their own understanding of core content and curricular materials. It also fosters their ability to produce their own questions and improve and prioritize them. This chapter's appendix provides a reference card for this process.

As we noted in the introduction, using the QFT requires one small, but significant shift in practice. You will not be asking the questions. Instead, students will be asking all the questions, and you will be facilitating that process. The first time you use this technique in the classroom, you may want to budget a minimum of forty-five minutes for the full process. As you and your students gain more experience, you'll find that you can run through the QFT very quickly, in ten to fifteen minutes, even when students are working in groups. There may also be times when your students will want to use the process alone or you will require that they work on their own.

Table 1.1 shows the QFT steps, teacher and student roles in each step, and the thinking abilities students develop. We will now look briefly at each of the steps (these will be described in full in the following chapters and focus on the specific thinking abilities they foster.

The first step in the QFT is developing and choosing the *Question Focus*, or *QFocus*. This is a stimulus that can come in the form of a statement, a visual or aural aid; anything that can sharply focus and attract the student attention and will stimulate them to formulate their own questions. It is designed to first facilitate students' divergent thinking, but is also designed with the teacher's end goals in mind so that students will need to practice convergent thinking as well. The QFocus is similar to a prompt, with one important difference: it is not a teacher's question but rather the focus for student questions. Chapter 2 will discuss in detail how to design a QFocus and will provide examples of how teachers have designed and used them effectively.

In the second step, four *Rules for Producing Questions* offer a rigorous structure—a protocol—within which students can produce their own questions. The rules set up the process for students to work on their own without assistance from the teacher:

1. Ask as many questions as you can.
2. Do not stop to discuss, judge, or answer any of the questions.
3. Write down every question exactly as it was stated.
4. Change any statements into questions.

TABLE 1.1

The Right Question Institute's Question Formulation Technique

	Teacher role	*Student role*	*Student thinking abilities*
The Question Focus	Set goals for use of the QFT and develop a QFocus.	N/A	N/A
Rules for Producing Questions	Introduce Rules for Producing Questions; facilitate discussions.	Discuss challenges in using the Rules for Producing Questions.	**Metacognitive:** Think and hear from each other about the challenge of "thinking in questions."
Categorizing open- and closed-ended questions	Give instructions to start process; monitor and support student use of the Rules for Producing Questions.	Work in small groups to ask questions related to the QFocus.	**Divergent:** Produce their own questions by following the Rules for Producing Questions.
Improving the questions	Facilitate discussion about open- and closed-ended questions.	Discuss advantages and disadvantages of open- and closed-ended questions; practice changing questions from one type to another.	**Metacognitive:** Think about purpose and use of different kinds of questions for securing information. **Convergent:** Practice changing questions to sharpen scope of inquiry.
Prioritizing the questions	Provide instructions on how to prioritize the questions. Monitor and support student prioritization.	Discuss, compare, assess, and prioritize questions. Select three priority questions and explain choices.	**Convergent:** Analyze, compare, and assess all questions and select three as focus for next steps.
Next steps	Provide direction for using the questions.	Use the questions for purposes set by the teacher.	**Convergent:** Use the questions for specific purposes and learning goals.
Reflection	Facilitate the reflection process.	Discuss what was learned, how it was learned, and what they now know or feel differently about.	**Metacognitive and convergent:** Thinking about the thinking and learning process and about where they are now compared with where they were when they began.

The teacher introduces the rules and asks the students to think about and discuss possible challenges in following them.

The rules ask for a change in behavior, officially discouraging discussion in order to encourage the rapid production of questions. Students thus need to think about how they usually work individually and in groups. They name their usual practices and become aware of how they generally come up with ideas. They then must distinguish their present learning habits from what the rules require of them. In other words, they must practice metacognition—that is, think about their thinking and about how they are being invited to ask questions. They become newly and keenly aware of a structured process. Students also are provided with a disciplined framework within which they are being challenged—directly—to not stop the flow of their thinking and to think in questions. This is a divergent thinking challenge and opportunity.

Producing questions is the next step in the process. The teacher presents the QFocus to the students and gives them a set amount of time to follow the Rules for Producing Questions and come up with their own questions. Students are invited to ask all kinds of questions—an exercise in divergent thinking. The teacher may need to guide students when they show any tendency to violate one or more of the rules.

The next step is to work on improving the questions. *Closed- and open-ended questions* are defined and discussed once the students have finished generating their questions. The teacher introduces a definition of closed- and open-ended questions, which the students use to categorize the list of questions they have just produced. Then the teacher leads the class through a discussion of the advantages and disadvantages of both kinds of questions. To conclude this step, the teacher asks the students to change at least one open-ended question into a closed-ended one and vice versa.

The process of analyzing the advantages and disadvantages of each kind of question encourages another level of metacognition as students think about the role and purpose of questions, the particular structure of a question, and how manipulating its wording can block or yield certain information. This discovery of the nature of questions allows them to think about the inquiry process in a new way. Then, as they work on changing the form of questions from one to the other, they must think about what they will find out, how the formulation meets their needs, and how it

can enhance their inquiry process that began with a purely divergent exercise. They begin to think convergently.

Once they have explored the nature of closed- and open-ended questions, students begin to *prioritize* them. Prioritization of questions may be based on a variety of criteria. The teacher, with the lesson plan in mind, offers guidelines and asks the students to look at their questions and come to an agreement about which are their priority questions. Usually, but not always, the teachers asks for three selections.

The students begin to look at the relative merits of the questions they have selected and how these questions will help them get the information they need. They must compare the questions to each other and assess which will be most helpful. They also begin to look at sequential matters, pondering which question would have to be answered first before the others could be answered or even considered. They are thinking again about the nature of a question, the information it will yield, and how to most effectively use the questions they themselves generated.

After this metacognition process, students are in a better position to think convergently, select their priority questions, and move on to *next steps* informed by the prioritization process. Teacher and students discuss a plan for how to use the questions developed in the previous steps. The teacher may give instructions on what is now to be done with the priority questions.

Reflection, the final step involves both content and process. The teacher will now ask the students a few questions, shifting back to familiar territory in which the teacher asks and the students respond. The questions can cover different areas of the process, asking students to think about and name what they learned, how they learned it, what is different about what they know or understand or want to know now than at the beginning, and how can they use what they learned, both in terms of content and skills.

In this step, the students are engaged in thinking about their thinking and learning process. They are naming not only what they learned but also how they learned it. This metacognition reinforces learning related both to content and skills. Because they are being asked to put their experience into words, they are able to think broadly about it. Because there will be different lessons for different students, as they hear from others in the class, students begin to think divergently about

all that can be learned from the process. Finally, as they conclude and name what was most important for them individually, they are thinking convergently, bringing their ideas together into conclusions.

THE ART AND SCIENCE OF THE QUESTION FORMULATION TECHNIQUE

The use of the QFT in the classroom is both an art and a science. It is an art because you are drawing on your implicit knowledge and the finely honed skills that allow you to creatively facilitate a range of individual, small group, and whole class learning experiences. It is a science because you are using a protocol—a series of tested, proven procedures that consistently produce this result: students think in new and deeper ways and can name those changes themselves.

Here is how art and science manifest in the Question Formulation Technique:

The Art

Design of the QFocus: This requires some creativity and imagination as well as a willingness to test and explore what works; it is meant to foster continuous improvement—much like the use of a traditional prompt.

Student group work: This is always an art and hardly ever a science. The dynamics of interactions and group composition can affect student work. Since these interactions shift and vary from group to group and moment to moment, managing group processes is always more of an art than a science.

Producing questions and changing of closed- and open-ended questions: This is a process the students get better at the more they practice.

Prioritization: Teacher instructions and student interests, knowledge, preferences, and dynamics all affect the emergence of priority questions; this process of growth and change requires creativity. As students get more practice prioritizing and justifying their choice of priority questions, they become better at these activities.

Next steps: Teachers or students or teachers and students together construct and shape the success of how questions will be used, a process that varies with every set of questions and assignments.

The Science

Adherence to one cardinal laboratory rule: Students ask their own questions; they do not respond to a teacher's question. This produces replicable results in the classroom cum laboratory where students are using a rigorous protocol for producing, improving, and prioritizing their own questions.

Use of the QFocus: Simply by presenting a focus for student questions, the dynamics of the classroom are changed. Students are now asking questions. They may produce only a few questions, but this is measurably more than they would have produced without the change to using a QFocus.

The Rules for Producing Questions: These are the minimum number of rules needed in order to get students to do something different—to start producing their own questions. Each works in conjunction with the others and together, they effectively provide both a creative and disciplined structure within which students can produce their own questions.

Knowledge of the nature of closed- and open-ended questions: This is often new knowledge for students, and it can be transformative as they see how the manipulation of a question allows them to get different information.

Reflection: This seems like such an open-ended invitation to thinking that it belongs more on the art side of the ledger. But regular use can produce consistent, replicable results by providing students with an unusual opportunity to name for themselves what they learned, how they learned it, and how they plan to use it.

In the chapters that follow, the full art and science of the Question Formulation Technique will come to life in the work of teachers and students.

APPENDIX

The RQI Question Formulation Technique™

- **Produce** Your Own Questions
- **Improve** Your Questions
- **Prioritize** Your Questions

Produce Your Questions

Four essential rules for producing your own questions:

- Ask as many questions as you can.
- Do not stop to discuss, judge or answer the questions.
- Write down every question *exactly* as it is stated.
- Change any statement into a question.

Improve Your Questions

Categorize the questions as closed- or open-ended:

- **Closed-ended questions:** They can be answered with yes or no or with one word.
- **Open-ended questions:** They require an explanation and cannot be answered with yes or no or with one word.

Find closed-ended questions. Mark them with a *c*.

The other questions must be open-ended. Mark them with an *o*.

Name the value of each type of question:

- The advantages and disadvantages of asking closed-ended questions.
- The advantages and disadvantages of asking open-ended questions

Change questions from one type to another:

- Change closed-ended questions to open-ended.
- Change open-ended questions to closed-ended.

Prioritize the Questions

Choose your three most important questions:

1.

2.

3.

Why did you choose these three as the most important?

Next Steps

How are you going to you use your questions?