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## An Overview

**O**ur journey begins with brief introductions to the stories of several teachers who have learned about their students' abilities to inquire, think, and figure things out. We will note the wide variety of information-gathering approaches illustrated here as well as what the evidence suggests about students' growth in the 21st century capacities.

Why stories?

We all know the power of a story. When we hear about how a student became valedictorian of her class, how a student won a prize or a scholarship, or how a parent raised a child to succeed against terrible odds, we not only are enlightened intellectually but also feel good for that person. Of course, not all stories are happy ones, but they come with content knowledge, a structure (beginnings and endings), and associated feelings.

We remember these stories well because with their settings, plots, characters, sights, sounds, and emotions, we easily store them in what psychologists call episodic memory. This is different from knowledge of facts, semantic memory. Both constitute declarative memory. First identified or named by Endel Tulving, episodic memory allows us to "travel back in time" to re-experience what happened in the past (see <http://eecs.vanderbilt.edu/cis/crl/episodicmemory.shtml>).

The point is that it's more fun, for me at least, to read short vignettes about teachers working in schools to bring about major changes within the lives of their students than it is to read a set of abstract principles, view a few charts, and attempt to interpret columns of data. All of that is

important because it provides structure, and you will find, I hope, sufficient intellectual structures and frameworks here to help interpret the short vignettes about these educators for the 21st century.

### **JOHN SELKIRK**

John Selkirk teaches first grade in the Ottawa-Carlton school district. He shared with me his very high level of challenge for his students—to think critically about people in stories they were reading. His rubric for this task (see Figure 1.1) is most intriguing, and all year I wondered how well he was doing with helping his students draw reasonable conclusions about people's feelings as seen in pictures. Right off the bat, John started challenging students with making observations and drawing good and reasonable conclusions (see Chapter 5).

If we wish our students to think critically, what are our expectations for how they will engage each other intellectually and socially? This was a most important consideration for John.

### **JESSE MACKAY**

Jesse Mackay started a new year at Coronation School in Edmonton with her second and third graders in a most unusual fashion.

On the very first day at her new school, Jesse decided to assess her students' inquisitiveness. Here's the way she described her experience with her combined Grade 2/3 class of fifteen students: "The very first thing I asked the students to do on the first day of school was to look around the room and after a few minutes come back to their desk with a question (or more). They could write it down if they liked or just remember it to ask for a whole class discussion. My assumptions about children and development were drastically challenged during this activity" (J. Mackay, personal communication, 2009).

What did Jesse learn about her students?

### **JENNIFER MONTGOMERY**

Jennifer Montgomery teaches second grade at Parkside Elementary School in Austin. Since shifting their focus away from more traditional methods of teaching, she and colleagues claimed they saw marked improvement in students' performance on state assessments, especially in mathematics. Not only did she note these developments, but she also

**Figure 1.1** Critical Thinking Assessment

Student's Name: _____				
<i>Levels</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>
Makes relevant observations	rarely	sometimes	often	always
Identifies most important points	rarely	sometimes	often	always
Justifies conclusions	rarely	sometimes	often	always
Asks powerful questions	rarely	some "yes or no" or factual questions	some open-ended questions	many open-ended questions that generate a lot of info
Is open-minded	considers only one point of view	considers some points of view	considers many different points of view	makes up mind only after careful consideration of all different points of view

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recorded students' improvement in asking good questions during units on marketing and building animal habitats. To what did she attribute her successes?

### **JASMIN RAMZINSKY**

Jasmin Ramzinsky teaches with Jennifer Montgomery at Parkside. She too altered the course of her teaching during a recent unit on the solar system. Following this shift from almost total teacher control, her students asked her the following:

Mrs. Ram, that doesn't make any sense. Why would you ask questions about my planet? You weren't doing the research, I was.

Mrs. Ram, I bet your kids kinda got bored with finding the answers to your questions.

I bet they did, indeed! As do many other students engaged in learning the way Mrs. Ram used to teach.

What did she do and with what kinds of assessments of students' growth?

### **SHAUNA ULLMAN**

Shauna Ullman teaches third grade in West Vancouver at the Mulgrave International Baccalaureate School. During my visit to her school and in subsequent correspondence, I discovered how she has used modern technology in ways in which most students will soon be engaged. In addition to tracking her students' growth during various units using her own record-keeping system, she helped students share their own wonderings and searches for answers on iPads during a three-week time period.

Having students become more fully engaged by using this and other technologies (Google Docs, cloud computing, Google+, iPhones, and the like) is creating a revolution in our schools.

I was most intrigued to discover what Shauna observed about her students' engagement and responsiveness with this technology and how it might have fostered growth in 21st century capacities—beyond, of course, learning how to be very comfortable navigating an iPad.

These technologies have the potential for enhancing students'

personal engagement with content—stuff to learn;

peer-to-peer interaction, here and around the world; and

responsiveness to our curricular expectations.

We will see how several schools are, in effect, transforming their enclosed four-walled, textbook-bound classrooms into open-air communication centers where students can access infinite amounts of information and communicate with interested and valued resource persons around the globe at the touch of a finger whenever they choose. Our challenge under these circumstances is to guide their ability to question, analyze, and critique such information and draw reasonable conclusions.

### **LORRAINE RADFORD**

Lorraine Radford also teaches at Mulgrave School. When I walked into her kindergarten classroom, I was amazed at the writings on the wall. Lorraine had students' questions in their own handwriting displayed as well as their later questions, formatted by Lorraine during a unit on sea creatures that involved group and individual research projects.

At the same time, Lorraine showed me one of the most elaborate means of recording students' questions over time that I've ever seen.

How does she take students who enter their all-day, yearlong kindergarten making statements and help them formulate a wide variety of questions, from "What if you're playing a game for two, and three people want to play?" to "Why does the mommy octopus die when her babies are born?" and "Does the angler fish think humans are fish?"

You will learn more about Lorraine in Chapter 7.

### **KERRY FABER**

Like Jesse Mackay, Kerry Faber teaches in Edmonton, Alberta. She has most generously shared much of her work that leads students to question and seek for answers. I have had the good fortune to visit one of her classes (winter 2010) and, recently, conduct Skype conversations with another. Kerry has long been interested in students' growing in their abilities to ask good questions in all subjects, and she has done amazing work with students in all ability ranges.

One of the units she regularly undertakes with her students is called Evidence and Investigation, a study of how we conduct good investigations to solve problems.

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A few years ago, she undertook this unit of study lasting about seven weeks with this diagnostic situation: “I thought for this first unit it would be best to begin getting them to develop inquiring minds. I gave the children a picture prompt. It contained a partial view of a classroom with children looking at an empty cage with a sign saying ‘please close lid.’ There are some sort of footprints leading from the cage to the door. There are also several other details included. I told the children that there was a problem(s) presented in this picture. In partners, they had to brainstorm possible problems based upon their observations and interpretations” (K. Faber, personal communication, November 2009).

Notice how Kerry has begun her unit, not with “Let’s open our books to page 25 and read. Who would like to read for us?”

No, what she did forms the essence of problem-based learning (Barell, 2007a, 2007b): presenting students with an intriguing situation that leads them to ask good questions and present tentative conclusions that need more investigation.

What do you think are the benefits of Kerry’s approach compared with the more traditional “Let’s open our books”?

Now, what did Kerry discover from this diagnostic exercise conducted at the opening of her very first full-length inquiry unit in September? “I found that some students didn’t understand what I meant by a ‘problem.’ They just listed things they observed in the picture” (K. Faber, personal communication, December 2009).

What a valuable lesson to learn right off the bat! Some students don’t know or cannot articulate what we mean by *problem*.

This is not all that easy. Try asking your students for their definitions of a problem. They might say, “When things go wrong . . . something you don’t like. . . .”

### MARY DARR

Mary Darr is the coordinator of STEM projects in Sandusky, Ohio. STEM represents an initiative to develop more interest and competence in science, technology, engineering, and math. The reason for this emphasis at the federal level derives from American students’ poor performance on many standardized tests when compared with students from various other countries. We rank way below number one, and recent, accepted state applications for federal Race to the Top funding included placing more emphasis on attempting to provide students with challenging learning experiences in STEM subjects.

The state of Ohio has what appears to be a highly developed network of schools fostering STEM projects, and I was fortunate enough to begin communicating with Mary Darr in Sandusky.

What you learn in Chapter 9 is how her students figured out how to build models of sky-high roller coasters for the Cedar Point Amusement Park right on the shores of Lake Erie.

There were some amazing results. “What were the most important aspects?” I asked students during telephone interviews and on end-of-project personal reflections.

“TEAMWORK” was the almost unanimous response.

How do projects for sixth, seventh, and eighth graders build such a united and positive response?

One student, Karla, actually went well beyond this assessment as well as those about learning how to think outside the box—creatively, that is.

Karla claimed, “STEM changed my life.”

How did it do that?

## **PAT BURROWS**

We all know them.

These are students whom eighth-grade literature and writing teacher Pat Burrows calls “cookie-cutter A” students.

These are very respectful students; some might be labeled as gifted. But what they are often gifted at doing is guessing what’s on the teacher’s mind and giving it back on various assessments. I remember some of them from my days of teaching the same subjects in New York City. When I challenged them to think on their own, they became befuddled because there were no right answers to put down on the test.

In Chapter 10, Pat tells us how she took Rachel from being such a student to being one who showed she had developed into a fine critical thinker, one who could tell the local bus company why their policy of dropping off students in the Catalina Foothills School District (Arizona) was less than optimal.

How did she do that? And how does she assess students’ progress in one of the schools that exemplifies an emphasis on 21st century skills and capacities?

## **RANDY AND JENNIFER GRAGG**

It all begins at home, and Randy and Jennifer Gragg are parents who took seriously the challenge laid down by the mother of world-famous nuclear physicist and Nobel Prize winner Isidore I. Rabi. Rabi’s mother did not, like

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many other mothers in Brooklyn, ask him when he returned home from school daily, "So, did you learn anything today?" No, she asked a different question.

In Chapter 11 you will see how the Gragg family took Sheindel Rabi's challenge to heart and how they monitored the growth of their young son, Spencer.

### MEANS AND RESULTS

Figure 1.2 represents the wide variety of means of information gathering used by the teachers who are here to share their stories. Analyses of this information give us insight into students' growth in many 21st century capacities.

A word of caution, however, is in order. My conclusions about students' growth are just that. And Pat Burrows's conclusions in accordance

**Figure 1.2** Multiple Means of Assessment

Teachers in this volume will present us with a wide variety of means of assessment:

- teachers' observations of classroom behaviors;
- teachers' reflections/analyses of students' work (using districtwide or individual assessment criteria and rubrics);
- students' journals, notes, and work products;
- students' thoughts, ideas, and questions recorded on Google Docs, wikis, iPads and other electronic devices; and
- students' reflections on their work—written, oral, and recorded on video.

These means will direct us to evidence of growth in the following 21st century capacities:

- inquiry,
- problem solving,
- critical/creative thought,
- cognitive development,
- reflection,
- teamwork/collaboration, and
- self-direction/resourcefulness.

with the Catalina Foothills School District's 21st century scoring rubrics are hers. In all cases cited here, I agree with the teachers' conclusions, but you may have doubts and would want to raise questions about these conclusions.

Good!

Here's what to do with these questions:

1. Discuss them during a teacher study group considering assessment of these important capacities.
2. Jot them down in your own inquiry journal, and try to find some answers, preferably with your colleagues.
3. Ask the teachers themselves. If you send me the questions (jbarell@nyc.rr.com), I'll forward them to the teachers mentioned herein.
4. Your ideas. . . .

## RELIABILITY AND VALIDITY

We should always raise questions of reliability and validity when considering evidence or data that purport to tell us something significant. This is true for evidence about change or growth in our children's capacities to think, to inquire, to reason, and to grow stronger as persons. This is perhaps especially true when we are examining, as we are here, data primarily from teachers' observations, students' self-reports, and students' work projects. We are not relying on standardized tests. They have their all-too-significant role in our educational lives, but they do not in many cases provide us with the information we seek about 21st century capacities. They are limited, one-time glimpses at students' abilities in, for example, reading comprehension and mathematical skills. For this they have their value.

We are interested in growth over time that is not currently measured by these kinds of tests.<sup>1</sup> You will read in subsequent chapters about growth within distinct units, during a year and between Grades 1 and 5 (see Travel Journals in Chapter 6).

## RELIABILITY

The reliability of a test refers to its consistency of measurement. Do we get the same results time after time? In different settings? At different times? This is a vital part of the scientific process, to redo the tests of somebody

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who claims, for example, that a meteorite presumably from Mars has evidence of ancient life. Or that chocolate (heaven forbid!) has deleterious qualities within it.

When we speak of the reliability of a particular service (e.g., energy) we want to know, Will it be there when I need it, consistently, safely?

When we speak of product reliability (a car or dehumidifier), we want to know if it will perform up to standards, consistently and safely. In other words, will it perform as advertised?

When we speak of the reliability of sources, we're asking, Is the information they are providing believable, trustworthy, unbiased? For example, if we read a restaurant review, we should ask, Are these objective, reliable sources, or are the reviewers the parents and children of the owners? Are the doctors we see on television reliable sources of information about the products they are selling—or are they, in fact, the creators of these products and therefore biased in their favor?

Are the teachers quoted herein trustworthy observers of their own students? Or are they biased because they want to see growth and development? We speak of interrater reliability in terms of grading students' papers. We could ask here if other teachers, people like yourselves, would interpret Rachel's work (see Chapter 10) in the same way. Would you conclude that she had developed her ability to construct good arguments using appropriate analogies and comparisons, for example?

And we need to ask, Are students reliable sources of information about their own thinking, feeling, and growth? Will they consistently provide us with information related to how well they can solve problems and work through complex situations? Or are they just telling us what they think will earn them credits and praise? Is Sydney a reliable source when she claims, "My inquiry skills shot through the roof" (see Chapter 8)? I think so, and so does Kerry Faber, because we have seen the evidence in the classroom over time and within several work products.

### **VALIDITY**

And we should ask, Is the information from teachers and students valid? Validity here has to do with the question of whether we are actually observing what we think we're observing. A valid test of a drug claiming to lengthen life must actually evaluate its power to add months and years to our lives (the Fountain of Youth drug!).<sup>2</sup>

For data about inquiry to be valid means that we have to be observing students' spontaneously asking questions, their own questions, not their copying somebody else's questions. For information about critical thinking to be valid, we must be observing students actually engaged in thinking

critically as defined by the teacher and/or the district—and doing so on their own, not merely in response to a given test or prompt.

For data to indicate that students are improving in problem solving, they must reflect students' actually solving problems they have never seen before, ones that call for them to use a variety of approaches on their own, without copying from a manual.<sup>3</sup>

Look at John Selkirk's and Pat Burrows's district rubrics for critical thinking (see Chapters 1 and 10). They give good, observable indicators of what they consider critical thinking, in part drawing reasonable conclusions with evidence to support them. Is this what you're seeing in Rachel, Pat's exemplary student? Or is it something else?

Self-reports are, it seems to me, good, reliable indicators of what students have experienced, and we too seldom consider them in attempting to understand what learnings have occurred. These may reflect what some have called the "collateral learnings," what students learn while being in our classrooms that might not be in our lesson/unit plans. Others have called these outcomes part of the "hidden curriculum."

We can rely on students' journals and the reflections therein if we think they are being straightforward and not merely telling us what we want to hear.

I am raising all these questions because we should approach all data like that in this book with that certain skepticism we define as critical thinking. I'm sharing the questions with you because I consider them valuable in and necessary to determining students' growth. We all should be raising these kinds of questions about interpreting data from students and teachers.

One final word about evidence gathering is in order: We should have a *representative* sample of *relevant* students' work. We cannot say that Rachel has improved in her critical thinking if we have only one essay to show parents. We need multiple sources of information gathered over time that reflect different kinds of challenges. This is another reason why we cannot rely on any standardized, one-time test to indicate students' growth in these all-important 21st century capacities. In figuring out the crime scene event in Chapter 8, Kerry Faber's students needed more than one piece of evidence. They required multiple pieces of information to confirm their conclusions.<sup>4</sup>

## A DISCLOSURE MODEL

So why are these questions important? They are important because the purpose of this book is to suggest ways that we can gather reliable and valid information about students' growth with 21st century capacities. What I

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hope we have in this book is a disclosure model for certain 21st century capacities, a model that communicates ways of doing the following:

1. define what these capacities are within a sound educational, philosophical framework;
2. specify the observable, performance behaviors (often in rubrics), asking, What does it look and sound like in our classrooms, on the playground, at home? and
3. design ways of observing, monitoring, and drawing conclusions about these capacities.

With this disclosure model we want to be able to communicate results to our students (they should be in on the decision-making process as well), teachers, administrators, parents, and members of the community. We must be able to sit down with parents, members of boards of education, and the voting public to say, "This program [be it Partnership for 21st Century Skills ([www.p21.org/](http://www.p21.org/)), STEM, International Baccalaureate ([www.ibo.org](http://www.ibo.org)), or an inquiry-and-problem-based learning initiative] is worth our effort. And here are results we have to support our conclusions. We have gathered this information directly from students' reflections about and our observations of their own work. We can see evidence of students' growth from unit to unit and from year to year. It is vital we continue with these programs, provide needed resources, and support our teachers in pursuit of their goals."

We cannot rely only on standardized tests to provide the data we need. These tests (though easy to administer and grade with Scantron machines) often have deleterious effects when we are continually pressed to show specific results in a given time with a specific cadre of our students.

## CONCLUSION

Each teacher has experimented with learning experiences that challenge her students in ways that reflect what they know and are capable of doing.

I hope that these vignettes will reveal several issues about assessing our students' abilities and understandings:

1. The nature, quality, and planning of assessment experiences are very important instructional decisions. We need to make many of them before we commence a unit, but not necessarily all of them. Planning for excellence (otherwise known as planning units of

instruction or curriculum development) and performance indicators (otherwise known as rubrics) are essential to any consideration of students' growth.

2. There is a wide variety of alternative, authentic ways to learn what our students are capable of and what they understand, far different from standardized or paper-and-pencil tests.
3. Who is assessed is an important equity issue. In other words, do we consider all students capable of the kinds of inquiry on which this book focuses? For years I've been concerned that we challenge only students within certain groups with the highest levels of inquiry, problem solving, and critical/creative thinking. All students deserve and need the kinds of challenges the teachers here are presenting.
4. How we use information gleaned from assessment experiences should guide our instructional processes and ought not to be used primarily for ranking students in accordance with national or state criteria. Ainsworth (2007) has called this use of data "predictive value."
5. The quality of the assessment experiences reflects the levels of intellectual challenge to which we hold our students. There are vast qualitative differences between the kinds of culminating experiences some of our students receive and those from a problem- or project-based learning environment. It is safe to say that we still have students who are assessed using tests of their abilities to memorize stuff, not to solve authentic, significant, and meaningful problems like the ones you are soon to read about.
6. Assessment is an ongoing process. We are always gathering information about what students do and do not understand and making appropriate adjustments. This occurs before, during, and after instruction because we are always taking in information, analyzing it, and drawing conclusions—perhaps within the blink of an eye!

These are just a sample of the many concerns and issues we shall encounter as we delve into various teachers' stories.

## ENDNOTES

1. Indeed, there are standardized tests of critical and creative thinking designed by Torrance, Ennis, and others. I have used these, but it is very difficult to set up effective research using control and experimental groups, especially in high schools.

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2. To be valid, patient selection must be randomized with comprehensive follow-up: “We’d want to see that the duration of follow-up was sufficiently long to see the outcomes of interest. It is also important that the investigators provide details on the number of patients followed up and if possible, on the outcomes of patients who dropped out of the study” (Centre for Evidence-Based Medicine, <http://ktclearinghouse.ca/cebm/practise/ca/therapist/validity2>). My wife, Nancy, and I recently received such a pamphlet full of claims that human growth hormones would have these Fountain of Youth results. I wonder.

3. When we asked second and third graders how they would teach friends to solve problems, after they had worked on various authentic classroom problems for weeks (e.g., preventing graffiti in their bathrooms), they said, “Make it littler . . . get to the main problem . . . ask a friend, look at the problem from a different angle . . . work it out on a piece of paper . . . believe in yourself” (Barell, 1995, p. 168).

4. Some districts are administering the College and Work Readiness Assessment, a test that does present authentic problems to students. And we can look to this to give us some data about students’ growth during high school, for example.

## REFERENCES

- Ainsworth, L. (2007). Common formative assessments: The centerpiece of an integrated standards-based assessment system. In D. Reeves (Ed.), *Ahead of the curve—The power of assessment to transform teaching and learning* (pp. 79–102). Bloomington, IN: Solution Tree.
- Barell, J. (1995). *Teaching for thoughtfulness—Classroom strategies to enhance intellectual development* (2nd ed.). New York: Longman.
- Barell, J. (2007a). *Problem-based learning—An inquiry approach*. Thousand Oaks, CA: Corwin.
- Barell, J. (2007b). *Why are school buses always yellow? Inquiry preK–5*. Thousand Oaks, CA: Corwin.