Expanding *Connections*: *Investigating Reality*—the School as 'Textbook'

Within *Connections: Investigating Reality (CIR)*[*] is a set of recurring investigations focusing on immediate reality. This "Right Here, Right Now" icon identifies those investigations:

Each of the investigations uses the school as a "target area"—a representative sample or example of reality to analyze. **Additional RHRN investigations are outlined below that may be used to expand *CIR*. Each of these investigations will actively involve learners in a broad spectrum of significant fields of learning.**

Traditional textbooks are, generally speaking, compendiums of *conclusions*, leaving the learner with little to do except try to remember secondhand information. As we've said elsewhere (http://www.marionbrady.com/articles/journal/1995-OpinionNAASPNov.pdf), the real world as a learning resource provides "unprocessed" information, allowing learners to use a full range of cognitive processes—analyzing, comparing, contrasting, categorizing, hypothesizing, synthesizing, and so on.

As a "slice of reality," the school has the obvious advantage of ready accessibility, and is complex enough to be studied for any length of time. Most importantly, it mirrors or models aspects of the larger world which are, and will remain, crucially important to the learner.

CIR has thirteen "RHRN" investigations:

(1) Identification of major features and mapping of the target area (p. 12). This opening investigation requires a variety of skills, and this first stage will probably take several days. Information gathered will be augmented and refined as later study proceeds.
(2) A search for patterns in the target area (p. 13). This investigation can run concurrent with (1).
(3) Organizing information about the target area into analytical categories, sub-categories, sub-sub-categories, etc. (p. 17)
(4) Identifying relationships between elements of the target area (p. 22)
(5) Identifying systems within the target area (p. 28)
(6) Identification of significant systems that involve humans (p. 35)
(7) Identification of societies in the target area (p. 46)
(8) Study of demographic characteristics and changes in school populations (p. 55)

[*] Important note*: Connections: Investigating Reality* has been revised and renamed *Introduction to Systems.* It contains all the original "RHRN" investigations, and others have been added. See http://www.mationbrady.com/IntroductiontoSystems.asp

(9) Identification of relationships between target area environment and human behavior (p. 65)
(10) Analysis of patterned behavior (p. 67)
(11) Summaries of shared, pattern-shaping ideas (p. 79)
(12) Diagramming of system change (p. 88)
(13) Correlating change and conflict/stress (p. 92).

These "big picture" characteristics barely scratch the surface of possibilities. Consider, for example, just one possible additional investigation:

Transportation Cost Analysis: ***Make a reasonably-accurate approximation of the cost of getting everybody in your classroom to and from your school today.***

Learners working on this task will soon realize that they need to answer a long list of ancillary questions. The investigation's first step is to generate those questions, such as: How many arrived by school bus? What does a bus cost? How long does it last—for how many miles? What are fuel and maintenance costs per mile? Does the bus make more than two trips per day, or serve more than one school? How can the average cost per student attending the school be computed? (Do school authorities have the information available? If not, why not?)

How many arrived by private car? How many miles were driven? What percentage of the car's total use does this represent? What's the average cost per mile to operate a car, including vehicle cost, insurance, fuel, maintenance, and so on? Are there costs associated with the time used by the driver? What do roads, streets, and parking lots cost?

How many people walked to school? With what associated costs—for example, for sidewalks, crossing guards, cars waiting with idling engines?

If students arrived by public transport such as a city bus system, similar questions should be generated. For example: Does the fare cover the cost of transportation, or is public transport subsidized by taxes? How does the cost of fuel affect the pattern?

Cost computations barely begin a list of possibilities. For example, if students arrive by private automobile, is that their only option? If there's a choice, what values shared by parents or students motivate them to choose to arrive by car instead of, say, by school bus or on foot? What changes are occurring in the patterns associated with transporting students? Why?

Working to solve these kinds of puzzles, learners give thought to a great deal of practical math, statistical analysis, economics, sociology, and other fields of study. Just the first step—developing a list of questions that must be answered—requires a great deal of thought. And, of course, questions invariably generate more questions.

The familiarity of the everyday and the mundane hides inherent complexity. As study proceeds, the familiar gradually becomes "strange enough to see," radically broadening learner perspectives, chipping away at the lack of awareness and the superficiality of understanding that contribute to and intensify real-world problems.

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To work with Investigations such as this one, and those outlined below, learners should develop a logical sequence of steps for problem solving, something such as:

1. Defining the task by identifying the main and subsidiary questions to be answered. This will be on-going. As the work proceeds, the questions may change, and new questions may arise. Note that the descriptive-analytical model developed by learners in CIR will become the main source of general questions, although each investigation will require its own, more specific questions.
2. Exploring ways to find answers--using direct observation, experiments, surveys, direct or written questions to authorities, library and Internet searches, and the like.
3. Interpreting the data and developing conclusions.
4. Preparing a report, including tables, photos, diagrams, written statements of the problem, procedures and conclusions.

Note the applicability of computer skills to each step of the process, particularly Step 4.

Preparing the reports should also be an on-going process, including draft review and suggestions by teachers or outsiders with expertise in language arts and other applicable fields. This reporting process, of course, provides ample evidence of student work for purposes of evaluation.

Some gentle control may occasionally be needed to ensure that work is distributed fairly, and that one or two assertive students don't dominate a work team. Every learner should be required to do some of the writing, for example. (Peer review of the quality of writing and other communications can be a part of group activity, which will likely have more impact and result in more improvement than review by an adult.)

Making sure that learners, to the greatest extent possible, are in control of the whole investigative process is essential to maintaining interest.

Systems

Every school contains or is affected by multiple systems that can be easily accessed by students. Some don't involve humans, or involve them only indirectly, and may be analyzed using questions suggested by the general systems model as described on page 25 of *CIR*. For example:

Weather and climate systems: See the suggested investigations in the document "*Connections: Investigating Reality* and Science" (http://www.marionbrady.com/Documents/ScienceConnections.pdf)

Other possible investigations: type and level of contaminants in rainfall (using pH paper to detect acidity levels, for example); cloud patterns/types and subsequent weather conditions, review of historical records to identify changes and trends in climate. What happens to the rain that falls on the target area? How does it flow? Where does it go? How much of it ends up in nearby streams? What pollutants are picked up during its flow?

Target area flora: What plants grow in the target area, including weeds and other "unintentional" plant life? (An inventory should be as complete as possible, documented with photographs or drawings. If possible, learners should identify a common or scientific name for

each plant.) Which plants are similar? In what way are they similar? Does the similarity indicate a relationship (say, exposure to particular amounts of sunlight or moisture)? Identify possible systemic relationships between plant location and the number and type of plants, and the rate of plant growth.

Other physical systems: These include the school's climate control, water, electrical, and waste disposal (both sewage and solid waste systems). Identifying energy use and loss may be of interest and significance. What's the source of energy for heating? Where does it come from? At what cost? What are the components of the system used to distribute heat (or cooling) within the building? How does this system work? Does energy production generate carbon dioxide or other gas as a side product? If so, what kind and how much? Are there other byproducts, e.g. ash? What happens to the other byproducts? What is the source of the electrical energy used for light and other energy needs? How much does it cost? How much of the energy consumed by the school is wasted? How efficient are the light sources at producing light instead of heat?

Analyzing the waste disposal systems may be particularly productive, including questions such as: What types of waste are produced? Where does it go? How is it processed? How much is recycled? Where will the waste be when learners are 60 years old?

What communication systems are used by the school? Are links bidirectional or unidirectional? How effective are they? Are they adequate? How might they be improved? Note that communications may be spoken, written, graphic, direct, at a distance, etc. Don't overlook such things as bulletin boards and handouts as part of communications systems.

Systems Involving Humans

The investigation of travel to the school suggested above is, of course, focused on transportation systems associated with the school. The main Model introduced in CIR is, more than anything else, a question generator. Applying it to immediate reality leads to questions such as these:

Environment: The school environment is the focus of early RHRN Investigations included in *Connections*. Transportation is an element of environment, and is investigated in detail in the cost analysis above.

Other questions may expand investigations of environment, e.g. Where, exactly, is this school? What does it look like on Google Earth? When was it built? How is it constructed? Is any part of the target area environment deteriorating? Why? What other problems with the building or grounds are present? What improvements might make a difference in how well the target area functions?

Questions about energy are included above, but additional questions are important. Besides energy, what other resources does the school use (e.g. paper, writing tools, cafeteria food)? What do they cost? Where do they come from? What impact does their production have on the earth?

Demographics: How many students does it serve? How does its ethnic composition compare to the larger society of which its population is a sample? Among students, what sub-groups, named or unnamed, exist? How big is each sub-group? Are overall target area

demographics and sub-group demographics different from ten years ago? If so, why have changes occurred?

Patterns of Action: What patterns do students follow while waiting to enter a closed door? What patterns are followed while eating lunch? What behavior patterns are associated with good news (e.g. unexpected free time)? Bad news (e.g. an unexpected test)? What greeting patterns are followed at various times and places in the target area? What patterns are associated with various levels of noise generated by students? Who runs the school? What do they do? Who makes which decisions? Should they or somebody else be making those decisions? Why?

Shared Ideas: What's the school's purpose? Who says so? Is it succeeding in doing what it's supposed to do? Why or why not? To what extent do shared ideas differ between sub-groups? To what extent do ideas differ between students and parents and other adults? Why does each student sub-group exist? To what extent does each sub-group solve problems? To what extent does each *create* problems?

Systemic questions involving more than one part of the Model: How much does it cost to operate the school? Who pays? How do they feel about that? Why? Who owns it? How do taxpayers feel about what they're getting for their money? How is the school likely to change in the next ten years? Twenty years? Why would these changes occur? Is the school likely to become more effective, or less effective? Why?

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An initial reaction to a suggestion that immediate reality be a focus of study may be that there's little of consequence to study. As the above prompts should make clear, there's enough "raw material" for months or even years of study, making selection necessary.

A second reaction may be that immediate reality isn't important enough to warrant the investment in time and work. Two characteristics of the work justify that investment: First, the cognitive processes being developed and enhanced are those that kids will be using for the rest of their lives. Second, little by little, they're constructing a descriptive-analytical "template" which, superimposed on any reality, says, "If you want to understand this particular reality, here's what you need to explore."

What may at first seem to be a focus of study too narrow or circumscribed to be of educational value eventually opens up enough possibilities for study to keep the most capable students involved indefinitely. Relevancy is never an issue, and the inherent complexity of the school allows it to model reality on any scale.

On evaluation: As with all the activities in Connections: Investigating Reality, we think traditional evaluation of learner performance is simplistic—primarily consequences of working with text *about* reality rather than reality itself, meeting expectations for grades that "fit" into the various so called "core" subjects, and the need to post at prescribed intervals. We favor continuous feedback about performance in the form of dialog.

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Webpage for ***Introduction to Systems*** (replaces ***Connections: Investigating Reality***):
http://www.marionbrady.com/IntroductiontoSystems.asp