Rubric for Evaluating RITES Investigations

February 1, 2010

The RITES proposal promised a rubric for evaluating RITES materials to be used by authors as they create materials, teachers as they customize the materials, and external evaluators. This rubric has eight dimensions for evaluating an Investigation. A reviewer assigns a grade score for each dimension ranging from F for unsatisfactory to A for outstanding. An Investigation is acceptable only if it earns a grade of C on each dimension.

The scoring rubric on the last page refers to eight questions, which are elaborated and explained below:

1. Structure: Does the Investigation make full use the RITES structure?

RITES Investigations consist of a Teachers Guide, one or more Activities, and a final assessment. Most Activities have the following sections:

Introduction. Tells the students what they will know, understand, and be able to do as a result of this activity. Set the context and pose a driving question. Describe any special requirements such as keeping a notebook.

Materials. A description of any unusual materials required for the Investigation.

Engage. Activate students' prior knowledge and connect it to this new learning. Engage student in the driving questions of this activity.

Explore. Present a model, lab, field site, or data and encourage explorations of the system. Challenge students to predict, observe, and compare their prediction to observations. Include guidance, procedures, and safety measures.

Explain. Ask students to explain what they have observed.

Wrap-up. Ask students to summarize their observations and extend them to new contexts.

Assessment. Have students demonstrate what they have learned with a few questions or an assessment activity, possibly structured as self-assessment.

The use of this structure ensures that the Investigation will meet RI guidelines for instructional materials, be consistent with AAAS evaluation criteria[1], and be aligned with educational research results. Deviations from this structure are acceptable, providing that the deviations are reasonable.

2. Science: Is the science accurate, current, and accessible to typical students?

All materials should have been reviewed by a subject matter expert. The reviewer's name and institutional position should be provided. Accessibility can be increased through graphics, animations, analogies, and the minimal use of technical vocabulary.

3. Standards Based: Does the material address one GSE standard?

Each Investigation should focus on key content of a single standard. That standard should be identified along with any prerequisite standards. There is too much content in most standards for an Investigation to treat thoroughly, but the RITES materials

[1] http://www.project2061.org/publications/textbook/algebra/summary/critdet.htm

should provide a vivid, memorable investigation of an important aspect of the standard at the level used in the NECAP assessments.

4. Inquiry Based: Does the material make good use of student inquiry?

Students learn best through inquiry—exploring some system or data with some guidance. The primary way students should learn with a RITES Investigation should be through guided explorations based on real labs or fieldwork, interactive computational models, or data from observations. Is there an appropriate use of each of the following approaches to inquiry in the investigation?

A. Observe something while following a list of steps (i.e., lab procedure)
B. Meet a challenge provided by the teacher (how it is met it is the student's choice)
C. Learn what you can about a situation (open-ended, wide range of material available)

Each of these approaches has a role in an activity, but the writer's goal should be to take a known activity that is traditionally done as type A and shift it toward type B or C.

5. Student Motivation: Do the materials motivate students?

Motivation can be enhanced by organizing the materials around a driving question, providing a context, and linking back to real-life situations. Connections with actual scientists are helpful, particularly if diverse scientists are featured. Good design, attractive graphics, and the minimum of technical vocabulary help sustain motivation. Motivation can be impaired for some students by using topics or illustrations that are not inclusive.

6. Teacher Support: Is the Teachers Guide accurate and complete?

The goal of the Teachers Guide is to provide all the information a teacher needs for a successful implementation of the Investigation. The structure of the Teacher Guide should be divided into general information about the Investigation and detailed information about each Activity. Complete information would include:

- A description of the standard addressed and the concepts that are make up the standard.
- Background science that typical teachers might not know.
- Typical student misconceptions and difficulties and instructional strategies for overcoming these.
- Classroom management suggestions for the diverse classroom.
- Support for using the materials in classes with one or many computers.
- Answers, explanations, and scoring rubrics for all the assessments and the student notebook.

7. Assessment: Is the assessment section complete and appropriate?

The assessments included throughout each activity are primarily for student self-assessment. In addition, there should be a final assessment at the end of each Activity and another for the complete Investigation. This should be aligned with the topics and GSE standard addressed by the Investigation. It should take the form of an online test or assessment activity that can be administered during one class period with at least

some items comparable to items on the NECAP or similar tests. It is important that the assessments be available both online and in a printed format.

8. Technology: Does the Investigation make good use of technology?

The "T" in RITES refers to technology, and a central strategy of the project is to use technology well. The general idea is that good uses of technology are interactive and that student inquiry is enhanced by having students explore using interactions that are facilitated by technology. These include interactive simulations that allow students to visualize phenomena, do experiments, and change variables; they also include probes that display data in real-time graphs. In both cases, experiments should provide insights into meaningful scientific questions, and not just provide cookbook confirmations of principles that the student has learned by rote.