

From Rhetoric to Reality: Applying Critical Science Education Precepts to Classroom Assessment of Student Learning

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VEXATION

I have a passion for assessment, in particular, performance tasks. As defined by Gitomer (1993, p. 244), this approach to assessment is a complex interaction among communities of learners based on discipline-specific norms:

A performance task is one that simultaneously requires the use of knowledge, skills, and values that are recognized as important in a domain of study and is qualitatively consistent with tasks that members of discipline-based communities might conceivably engage in. Assessment entails judgment and reports of the quality of performance by community members.

My interest in performance assessment is fueled by a desire to enhance its performance, to do it “better.” My understanding of what makes for better assessment, performance or otherwise, has evolved over my 30+ years as a professional educator.

As a K-12 classroom teacher, better assessment meant moving beyond traditional selected response formats (e.g., multiple choice, true/false, matching items) to projects and performance-based tasks. While teaching high school biology I explored strategies such as the traditional “lab practical” as well as extended projects involving a variety of media to portray student learning. I also experimented with incorporating student choice in assessment. Over the years I had students who chose to demonstrate their scientific understanding through formats including popular music (“Bio-raps”) and studio art (acrylic painting of an ecosystem accompanied by an oral explanation of the scientific elements and principles depicted therein). I recall a self-devised, novice educational experiment in which I offered students a choice of the type of end-of-unit test they would take: standard (mix of publisher-provided selected response items), essay, or oral report. The results fascinated me, in particular the case of Travis, a soft-spoken (in class, at least) African American student who chose the latter option. While he “aced” that particular test, what stands out for me is *why* he chose the oral examination option. As he explained on his questionnaire, he based his decision on a personal desire to improve his oral communication skills, not because public speaking was his preferred or most proficient form of communication. I remain humbled by his trust in the supportive environment of our classroom learning community.

Such student creativity and risk-taking in the context of assessment has been a continuing source of inspiration to me. In essence, my vexation is how to have classroom assessment exemplify such positive integration of student ability and creativity serve as the norm rather than an anomaly. This is particularly frustrating in the current climate of accountability that relies heavily on high-stakes standardizing testing in which selected response formats dominate. While numerous, one particularly pernicious consequence of this practice is the unwarranted privileging of restrictive assessment strategies as the gold standard for measuring student learning. This vexes me.

While pursuing a doctorate, my notion of better assessment became informed by the literature and actual research. As a doctoral student I was inspired by Wolf and colleagues’ conceptualization of the “epistemology of the mind” and its concomitant “culture of assessment,” both of which celebrate various forms and expressions of the basic human trait of “capacity for thoughtfulness” (Wolfe, Bixby, Glenn, & Gardner, 1991). For my dissertation I explored the implementation of a science performance assessment in classrooms exclusively composed of English Language Learners (Shaw, 1997). Key findings from that study included student- and teacher-generated recommendations for the equitable use of performance assessments (e.g., “guide the students so they know what to do” and “participate in the development of tasks and rubrics”). Implied in these and other recommendations is a sense of supportive interaction and mutual obligation to ensure that the assessment process benefits rather than penalizes the learner, regardless of her or his level of proficiency in English. Such norms, obligations and expectations represent aspects of Coleman’s (1988) social capital inherent in performance assessment.

More recently, while a university faculty member I found my still-developing vision of better assessment eloquently voiced by Fusco and Barton’s (2001) description of performance assessment, viewed and enacted through the lens of critical science education. Their conceptual framework includes concrete criteria, namely that performance assessment should:

- Address the value-laden decisions about what and whose science is learned and assessed and include multiple worldviews
- Emerge simultaneously in response to local needs
- Be seen as a method as well as an ongoing search for method

Implicit throughout their discussion of critical science performance assessment (my own blending of their terminology) is the theme of student empowerment which is buttressed by the belief that “performance assessment provides an excellent resource to help create a participatory and inclusive practice of science that draw more closely and critically from the culture and practices of young people” (Fusco and Barton, 2001, p. 352).

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Fusco and Barton enacted critical science performance assessment in an out-of-school context. My desire, and more finely stated vexation, is to implement it in everyday classrooms. Difficulties in doing so arise in part from the previously mentioned accountability climate as well as more traditional challenges such as the relatively greater time requirements and the lack of teacher familiarity and fluency with performance assessment. Nevertheless, I remain committed to finding ways to have assessment contribute to equitable science teaching and learning, particularly for culturally and linguistically diverse students.

VENTURE

My current position as a science education faculty member affords me several potential avenues for addressing this issue. I could, for example, more deeply explore ways in which critical science performance assessment might be incorporated in my teaching, especially in my science methods course for prospective elementary teachers. However, I am drawn to an opportunity that is in some ways more challenging and timely in terms of immediate demands on my attention.

I am Co-Principal Investigator on a recently funded NSF project whose aim is to better prepare future elementary teachers to teach science to English Language Learners. The project is based on a model of linguistically and culturally responsive pedagogy that prior research has demonstrated significantly improves the achievement of English Language Learners.

Within the project, my focus is on the study of student achievement, a small yet important component of the overall effort. The goal of the student achievement study is to document student learning of science content, with the expectation that the resultant findings contribute evidence of the efficacy of the project's approach. The project's design includes control and experimental groups, thus the student achievement study may compare the learning of students taught by teachers trained in the project's pedagogical approach with that of students taught by comparable teachers lacking such training.

Currently nearing its first year of operation, the project has been engaged in startup activities such as building community amongst the various participants – it spans four university campuses – and fine-tuning the design for the science methods course, the central vehicle for orienting the pre-service teachers to the project's pedagogical approach. This fall, as we enter the second of four years of funding, more direct attention will be paid to providing the training to campus-based cohorts of pre-service teachers and planning for the collection and analysis of student achievement data. The latter activity will take place in years 3 and 4, when successive cohorts of projected trained teachers are in their first year of full-time classroom teaching.

Building on plans put forth in the grant proposal, the time is ripe to shape the project's student achievement study in ways that incorporate principles and practices of critical science performance assessment.

Considering project parameters such as a limited budget for this strand of work, the student achievement study currently is conceptualized as follows:

- Conduct a comparison study on Control v. Experimental First Year Teachers (FYT) using state science test data if practicable (e.g., sufficient numbers of FYTs wind up teaching 5th grade)
- Generate case studies with a small group of Experimental FYTs – perhaps 10 each in years 3 and 4
- Case Study Experimental FYTs teach one or more common science units with an associated science content pre/post test
- Select the common science unit(s) from the list of instructional materials adopted by the State of California that do not present a traditional textbook approach
- Case Study Experimental FYTs will modify the common science unit(s) so that it exemplifies project pedagogy

My interest with Crossroads is to engage in conversation around how the above-listed critical science performance assessment (CSPA) criteria can be applied to the design of the project's student achievement study. Questions include:

- a. Are there existing assessments that model one or more of the CSPA criteria?
- b. What might be a process for modifying existing assessments or developing new ones such that they reflect CSPA criteria?
- c. Are there existing case studies that can serve as models for those to be undertaken by our project (e.g., reflecting CSPA in classrooms)?
- d. How might the project case studies be designed to capture aspects of CSPA that may be enacted or otherwise provide information in relation to those criteria?

One possible outcome is that some form of critical science performance assessment becomes an integral part of the project's student achievement study. More broadly, I hope that the time and energy I put into that study builds trusting relationships among researchers, teachers, and students that will enhance understanding of student learning, if not student learning itself.