

The Demands of Alternative Assessment: What Teachers Say

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Margaret is an experienced high school mathematics teacher who is always searching for ways to “get the kids turned on to math.” As a result, she is very concerned about understanding better the diverse student populations she teaches, and she recognizes that her traditional teacher-centred methods of teaching and assessing often did not allow her to reach all her students. For the past three years, she has been involved in an inservice program on alternative assessment, and she has used many new techniques, such as portfolios and open-ended questions, to enrich the mathematical environment in her classroom. She recalls her earlier days of teaching, which she describes as lecture- and teacher-oriented. Then, her students seldom worked together. She assigned them mostly algorithmic exercises, which also dominated her tests and quizzes. Although her students were generally successful, something was missing for Margaret. She wanted students to share her excitement about mathematics, but this enthusiasm was rarely apparent. She “wasn’t brave enough to go outside the traditional setting” until she became involved with other like-minded teachers who shared her desire to teach and assess mathematics differently.

The following open-ended question contrasts with the narrow questions that Margaret typically asked before becoming involved with alternative assessment. Her students’ responses enriched Margaret’s understanding of what mathematics they were really learning.

Problem: Write the equation of a parabola that opens downward and whose vertex is in the second quadrant. Support your selection.

Karen responded in the following manner.

$$y = 2x^2$$

x	y
-1	2
-2	9
-.5	.5

David’s answer follows:

$$-3x^2 = -4(5)y$$

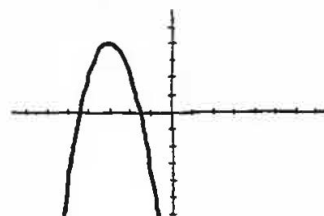
I got this answer because I know a parabola has an x -squared term. I put a -3 in front of the x -squared term and a 5 in front of the y term to make it in the second quadrant. Then I put a -4 in front of the $5y$ to make it open down.

Alisha’s solution included a graph (see Figure 1):

$$y = 2 - (x + 3)^2$$

Its [sic] a parabola because the x term is squared and the y term isn’t. The 2 modifies the y -coordinate and the 3 modifies the x -coordinate. This make [sic] the vertex be in the second quadrant. The negative sign in front of the parentheses makes it open downward.

Figure 1. Alisha’s graph



Although their grades had not differed dramatically when these students were assessed on algorithmic tasks, Margaret realized that they had quite different understandings about graphing parabolas. Karen was vaguely aware that a parabola involves squaring one of the variables, but she was unable to produce an equation that would meet the constraints of the problem. Margaret did notice that Karen attempted to place her parabola in the second quadrant through her choice of data points. David was aware that certain numbers in the equation would determine the location of the parabola’s vertex, although the vertex of his parabola remained at the origin because he worked only with the coefficients of x^2 and y . Like Karen, he failed to check his reasoning by drawing the parabola. Margaret was impressed with the thoroughness of Alisha’s response. Alisha realized how to create a parabola that opened downward and how the vertex could be translated into the second

quadrant. Further, she supported the equation that she created by actually drawing the parabola. Margaret decided to share this response with the other students to convey her expectations about what constitutes an excellent response.

These and other students' responses were eye-openers for Margaret because she could see the range of students' understanding of the relationship between the equations and graphs of parabolas. This realization encouraged her to change both her teaching and her assessment in many ways. She now routinely uses open-ended questions in class as well as on tests and quizzes as she encourages students to explain their reasoning. She admits that her classroom is sometimes chaotic, but she wants her students to explore and discuss mathematics. She has found herself trying "to think about all the things I may be not asking the students to tell me." Interestingly, she has found that "my students seem to enjoy mathematics more, which has enriched my teaching." Somehow, the extra time and effort for teaching and assessing mathematics in this way have been a good investment for both Margaret and her students.

The Demands of Alternative Assessment

The recent reform associated with alternative assessment has many facets, including teachers' use of portfolios, open-ended questions, journal writing and projects designed to elicit students' ability to communicate mathematically. The intent of alternative assessment is at least twofold. First, it encourages students to think more deeply about the mathematics they are learning. Second, it is a valuable tool for teachers to use in revising and redirecting their teaching when necessary. Teachers who have implemented the assessment standards have found that they have a better idea of their students' understanding of mathematical concepts (Seeley 1994, 5). Hancock (1995) suggests that integrating instruction and assessment in a continuous cycle blurs the boundaries between assessment and instruction, thus resulting in a more coherent instructional program.

But the advocated shift away from "treating assessment as independent of curriculum or instruction" and toward "aligning assessment with curriculum and instruction" (NCTM 1995, 83) comes with a price. Without question it places additional burdens on teachers in terms of planning for instruction and assessing students' performances. The following section focuses on issues that teachers have raised when implementing alternative-assessment methods.

Teachers' Perspectives of Alternative Assessment

Over the past several years we have interviewed teachers, observed their teaching and assessment methods and worked with them as they implemented various aspects of alternative assessment. Every teacher implemented some aspect of the assessment standards, outlined in the *Curriculum and Evaluation Standards for School Mathematics* (NCTM 1989), but no teacher implemented all the recommendations. Teachers had to find what was comfortable for them as they reformed their teaching and assessment methods. Here, we focus on five issues that were central to most teachers: (1) loss of predictability in the classroom, (2) content coverage, (3) familiarizing students with the teacher's expectations, (4) dealing with increased demands on time and (5) communicating with parents.

Loss of Predictability in the Classroom

It seems fair to say that most classrooms are grounded in predictability. Students expect it; most teachers demand it. Yet alternative assessment creates a climate of unpredictability because we can never be sure what students are going to say when we ask about their mathematical thinking. This unpredictability can be a challenge for teachers, especially those who feel more comfortable in a well-organized and predictable classroom. Alternative assessment does not doom one to a chaotic state, but a teacher-centred classroom with limited mathematical objectives is contrary to what alternative assessment is all about.

Loss of predictability makes the use of alternative assessment risky for some teachers. For Margaret, it was not a problem. She admitted that sometimes her classroom was chaotic, but "planned" chaos was within her zone of acceptability. In contrast, another teacher, Ellen, thought that the risk was too great and relegated alternative assessment to open-ended questions used as warm-up activities or as bonus questions on tests. She recognized her reluctance but was concerned about engaging in open-ended questions in class discussions because of their inherent unpredictability. Observations of Ellen's classroom indicated a tightly controlled, teacher-centred classroom with tests that focused on predictable algorithms or questions that had been well rehearsed during class. Another teacher expressed her concern this way: "If an administrator comes in to observe you and if he doesn't realize what you are doing, then he is going to mark you down because your class is kind of loud."

Still, some teachers find it a relief to loosen the reins. One teacher stated that becoming involved in alternative assessment has allowed her to let go of always requiring a particular answer and of making the students "practise a million problems" because she knows that as students work with a particular topic, they will get practice "where it's needed."

Content Coverage

Another issue is related to covering the mathematics content. Common wisdom suggests that trade-offs are necessary between emphasizing higher-level-thinking skills and focusing on drill and practice. Yet project teachers maintain that they have no evidence that an emphasis on alternative assessment inhibits test performance. Content coverage and performance on high-stake tests are exceedingly important issues for teachers. This concern is particularly acute for teachers of upper-level mathematics courses, which heavily emphasize preparing students to "take the next course" and to score well on standardized tests. Our observations suggest that as teachers teach higher-level content, they develop a certain conservatism with respect to implementing alternative-assessment methods. Middle school teachers, for example, are much more likely to use journal writing and portfolios than are secondary teachers, perhaps because their grading schemes generally place less emphasis on tests.

Familiarizing Students with the Teacher's Expectations

Many teachers saw a need to include more open-ended questions in their discussions with students. In part, they believed that it was "better mathematics," but some also thought that it was necessary for the students to "practise" answering open-ended questions before they encountered them on tests. The teachers wanted to be fair. Margaret, for example, wanted to share Alisha's response on the parabola problem with other students so that they would have a clear idea about what she regarded as a high-quality response. The issue of grading and subjectivity and the corollary of being consistent are major concerns to teachers and students alike.

To some extent the issue of consistency can be defused through developing and using scoring rubrics. A few teachers involved students in creating scoring rubrics with some success. Shepard (1995) states that such an approach affords a context for helping students learn to assess their own learning and to be reflective. Clarke (1995) advocates negotiating rubrics with students by giving them examples of high-, average-, and low-quality performance and then having

them assess other responses. Too, this approach helps students identify qualities that characterize outstanding performance, increasing the likelihood that they will demonstrate such performance. Nevertheless, some students—particularly those who have always done well with traditional, algorithmic tasks that lead to a single, numerical right answer—are anxious and concerned about being assessed by the use of open-ended questions.

Dealing with Increased Demand on Time

Teachers who are considering alternative assessment frequently ask, "How much time does it take?" The use of alternative assessment can appear overwhelming. Indeed, we encountered no teachers who used portfolios, journal writing, projects and tests that were dominated by open-ended questions. Different teachers have different comfort levels with each approach. Nearly 40 percent of one teacher's test items were open-ended, but he used little else that could be characterized as alternative assessment. In contrast, another teacher made extensive use of journal writing and projects, but her tests emphasized problems with single, numerical answers. These contrasts have to do with an individual teacher's comfort level when using various facets of alternative assessment. An experienced project teacher emphasized to teachers new to the project to "start small and go from there. Select just one class to do portfolios with . . . because until you've been through the process of evaluating completed portfolios, you don't really know what you're getting into. So start small, feel comfortable and then expand."

We found that presenting a context for teachers to take a simple, initial step was a significant help in addressing the time issue. For example, questions of the form "What's wrong with this?" are easy to generate yet elicit responses that reveal much about students' understanding of mathematics (see Cooney, Badger and Wilson 1993). Most project teachers felt comfortable asking such questions and found that the time it took to grade them was not prohibitive. Still, the problem of creating good, open-ended items is significant for many teachers. Our project teachers profited from sharing items used by others: "I've tried this and here's what happened and here's why this is a good item." A good bank of items was very helpful to the teachers.

Communicating with Parents

Parents are understandably concerned about their children's grades. They complain when they feel unable to help their children, especially on more open-ended tasks with which they are not familiar.

Some parents have difficulty interpreting their children's grades when alternative assessment is used, expressing the view that the grades are too subjective. One teacher explained that her students "are given a grade on their math content, on their written explanation, and [on] their visual product." But some parents consider that "appearance or neatness and things like eye contact are just a lot of fluff." Parents also question whether projects involved significant mathematics. However, teachers have found that parents, once educated, are "surprised at the [amount of] mathematics involved." One teacher, Sally, found considerable support from parents once they had a sense of what she was trying to accomplish. When she explained the survey and data analysis that she had expected her students to do and the rubric that she had used to score the students' work, the parents were quite impressed. Sally summarized their reactions in the following way: "They realized what a marketable skill it was for a student to be able to present raw data mathematically and attractively using computer software. They felt I was fair."

Several teachers commented that alternative assessment has facilitated their communication with parents. One teacher was confronted by a set of parents who were concerned that their child was placed with the "slower students." She showed them their child's portfolio to support her position that their child did not have the requisite skills for a more advanced class. Another teacher recalled showing parents their child's responses to open-ended items that suggested that "the child can solve the problems but can't show her reasoning. When I ask these questions, I'm determining whether or not your child understands."

Several teachers have found that parents like alternative-assessment tasks that engage students in writing activities. Portfolios, journals, nonroutine problems and open-ended questions have brought "lots of positive parent reaction. Parents like journal entries, the writing. They like the fact [that] students are learning more than multiple-choice answers. . . . They see the purpose of essay questions, that the students must understand."

Professional Development and Alternative Assessment

"The best thing that's happened to me in my career," offered Marsha, "was working with other teachers on using alternative assessment." Despite all the reservations and the demands placed on their time, teachers see a value in alternative assessment that goes beyond the benefit to their students. They see themselves in a different professional light—as being

empowered. Another teacher summed up their feelings in this way: "I'm glad to see we're doing it, but it's hard. This is one of the hardest things that I've ever tried to do. It's more difficult than changing textbooks and learning a new curriculum because basically you're changing your whole teaching style." Even those teachers who consider themselves "movers and pushers" of the *Curriculum and Evaluation Standards for School Mathematics* (NCTM 1989) find that the time required to "be creative" is demanding but "we're going to have more students turned on to mathematics, and that's [our] goal." The teachers realize that they can change their ways of teaching and assessing mathematics. Another teacher, like Margaret, reflected on how she formerly taught mathematics. "You wouldn't see my students working cooperatively as much. . . I used to teach in lecture form. . . it was a right or wrong answer." Lastly, many teachers expressed appreciation for the increased communication with their students that alternative assessment had afforded them.

A Closing Comment

If the project teachers have such high regard for alternative assessment, why are many other teachers reluctant to try this approach? One teacher's answer to this question was that teachers like to stick to the "old ways because it's easier to go page by page." Another teacher believed that teachers may not be aware of what students can do. "I now know what they're capable of. When I first did this, I didn't know what the students could do." Perhaps the strongest endorsement for alternative assessment was offered by a teacher who stated, "It's assessment. I hope that other teachers will learn that—it's assessment, not alternative assessment." Although the demands are many, we hope that what is uncommon today will become common tomorrow in the way that we teach and assess our students—as it was for many of the project teachers.

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Municipal Park

A municipal park has recently been opened in the ancient city of Danechester. The park is rectangular in shape. When I asked about its dimensions, I was given two somewhat odd items of information. The first: The diagonals of the park, plus its longer sides, were together equal to seven times one of the shorter sides. The second: the length of one diagonal exceeded that of one of the shorter sides by just 250 metres. What is the area of the park?
