

Mathematics Assessment

Walter J. Kohn

RESEARCH IN MATHEMATICS EDUCATION

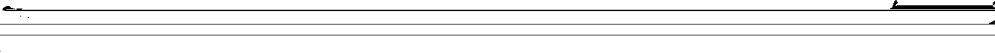






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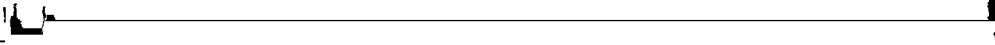
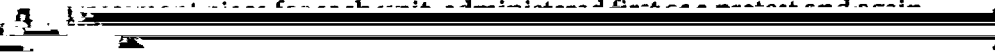
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we required students to document attainment of mutually agreed-upon goals in a portfolio format for a pass-or-fail grade. We found this approach had similar mixed results.

More than anything, I wanted to be fair and honest with the students and respectful of the work that they were doing, honoring progress as well as finished products. During the school year, I had open discussions with students to ask what they thought about school, grades, and report cards, and what they would like to see changed. I



wanted to create a unique assessment system that combined aspects of goal setting and self-assessment with more uniform standards of achievement. Inherent in this system was the recognition of learning as a process and greater attention to student improvement. Improvement and growth were measured by comparing scores on a single



cases in which the student failed to demonstrate any learning or progress. This redefined grading system combined elements of de

Lepp's trilvel assessment pyramid and reasonable expectations for

grading rubric, so students could keep track of their progress throughout the unit (goals they had demonstrated, what remained yet to be demonstrated, and their current grade). An example of the student record sheet is shown in Figure 12.2.

I organized my grade book by main content objectives, with space to record student performance as 0 (not yet), 1 (in progress), or 2 (demonstrated). I heeded caution to keep the assessment load manageable by limiting the number of times I formally assessed each objective (one or two tasks or opportunities per objective), especially as I had made a commitment to trust in-class observation and other informal assessment strategies as valid information. Also built into the system was the opportunity for retakes or "prove-its," which were opportunities for students to conference with me about what was incorrect and to redo a similar task to prove that the concept was understood. This

6. Articulation of estimation and calculation strategies	0	1	2
7. Relate percents to fractions and decimals	0	1	2
8. <u>Work backward to find starting price or discount</u>	0	1	2

Analysis and Extension Level (Interpret, analyze, draw, and justify conclusions, construct informed opinions, extend and generalize)

9. Compound interest (rule of 72)	0	1	2
10. Refuting common misperceptions with percent	0	1	2
11. Finding a percent of a percent (forward and backward)	0	1	2
12. Extended thinking	0	1	2

Work Habits				Participation			
Timeliness	0	1	2	Math chats; class discussion	0	1	2
Quality	0	1	2	Readiness	0	1	2

Grading Rubric

A	B	C	D	F
<ul style="list-style-type: none"> All basic skills demonstrated; most applications demonstrated Some extensions at least in progress; work habits and participation are <u>exceptional</u> 	<ul style="list-style-type: none"> All basic skills demonstrated; most applications at least in progress Work habits and participation are consistent 	<ul style="list-style-type: none"> Most basic skills demonstrated Work habits and participation are somewhat consistent 	<ul style="list-style-type: none"> Most basic skills at least in progress Work habits and participation are inconsistent 	<ul style="list-style-type: none"> No evidence of any progress or understanding at any level Work habits and participation are nonexistent

Increased Student Involvement, Accountability, and Self-Advocacy

One immediate benefit of shifting from an emphasis on grades to an emphasis on assessing understanding was the impact it had on student communication and involvement. The student record forms, progress reports, and class conversations about assessment played a

major role in increasing student fluency in the language of mathematics so that students were able to communicate the specific skills that they were learning and the concepts that they did not understand. They also were able to communicate what they were learning to parents and others. Even without the benefit of the forms in front of

them, many students were able to articulate a clear understanding of and appreciation for the assessment process. The student responses in the following interview excerpts illustrate some student perceptions of this approach:

Interviewer: Describe how things have changed between the old system and the new system.

Student: In the old system, she would like give you sheets and stuff to work on, and then she would score it. So if it was late, you would still get a point off whether or not everything was right on it. And now she is looking for how well you have demon-

ing goals. As a result, I decided to institute "math chats."

Similar to the fun book chats my language arts teammate had developed as a more interactive alternative to regular book reports, math chats were organized during the mandatory tutorial period or after school as informal opportunities for students to demonstrate achievement of learning goals and verbalize higher-level thinking. During a session, I would sit with a small group of students to discuss either an area of mathematics they were struggling with or an enrichment activity they wanted to explore further. Students established the goal of the session. Sometimes students selected the math problems they wanted to discuss, and other times I would select "brain stretchers" to push students to extend and apply their mathematical knowledge in new ways. I quickly found that math chats gave me additional insight into students' math thinking, abilities, struggles, and comprehension in lieu of constant test writing and grading. Math chats also were an opportunity to try out questioning techniques and instructional strategies to help students overcome challenging content, techniques that I would use in later lessons. For example, for a group of students who

Although increased stu
with students contribute to
dents' interest in learning ch
vation to raise the academi
the three levels of reasonin
plan tasks and activities that
as a result, to raise my own
so that I could offer challen
dents who wanted to press b
dents continuously rose to
achieved more than ever be

Interviewer: What is the diff

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percentages).

Grade 8—Introduction

- Understand how different algorithms work for arithmetic computations and operations. Use appropriate computational methods (e.g., mental, paper and pencil, calculator, computer, spreadsheet) for situations with rational numbers.
- Perform operations on rational numbers (add, subtract, multiply, divide...). Understand the concept of proportion and the applications of proportional reasoning (e.g., scale, similarity, percentage, rate).
- Apply proportional thinking in a variety of problem situations that include
 -)Ratios and proportions (e.g., rates, scale drawings, similarity).
 - >Percents, including greater than 100% and less than 1% (discounts, rates of increase and decrease, sales tax).

Curricular Goals and Objectives:

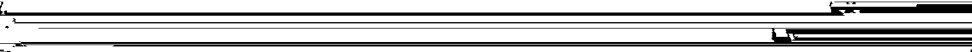



Basic Skills Level

1. Reasonable estimations (multiplying decimals and fractions).
2. Accurately multiply fractions and decimals.
3. Find the percent of a number.
4. Calculate discount and sale prices.
5. Compute total cost with tax.

Application Level

6. Relate percents to fractions and decimals.
- 7.

to hear strategies and approaches in the hope of identifying students' diagnoses and struggles. Conversations and student-led justification



and explanations became more than occasional practices employed for the sake of variety. Instead, they became my primary methods for gauging and documenting student understanding.

REFLECTIONS AND FUTURE IMPLICATIONS

Let me state, first and foremost, that I do not in any way wish to promote the product described herein as the definitive assessment system. Rather, this chapter recounts a journey of experimentation with assessment models and practices that is by no means over. Assessing for understanding and teaching for understanding both rely on dynamic interaction and construction of meaning rather than static procedures and formulas. No system can be canned and reproduced without inviting the resentment from teachers that might result from top-down

A Philosophy of Respect for Students

Because true educational reform above all should benefit students, a desire to improve the learning opportunities for students will not be made willingly unless one is motivated by a concern for their welfare. It takes little effort as a teacher to maintain teacher-centered practices. Student-centered teaching and assessing, however, require great effort

and perseverance. They also require the willingness to take risks. Unless teachers see improved student performance and engagement as

to growth, making it possible to view assessment with a...