Assessment

This issue edited by

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Over the past ten years or so some very different ideas and terminology have emerged on the mathematical assessment landscape:

- a change from behavioral to cognitive views of learning and assessment
- a move from paper and pencil to authentic assessment (authentic referring to a context relevance task to the student)
- the introduction of portfolios--from single occasion assessment to samples over time, selected by negotiation between student and teacher
- a recognition of the multi-dimensional aspect of assessment rather than single attribute assessment, thus considering students' many abilities and talents and providing opportunities for students to develop and exhibit diverse abilities
- a move from near exclusive emphasis on individual assessment to group assessment, thus involving peers and self as valid assessors

We know from new cognitive learning theories that learning does not occur bit by bit in a linear, carefully organized sequence. Learning can be quite chaotic or erratic, and is an ongoing process where information is received, interpreted, connected, reorganized, revised, and reformed into personal knowledge structures or schemas. Each of us creates a personal unique understanding of the world, within a world of shared meaning with others -- a social world. Because learning is multifaceted, involves cognition, metacognition, and affect, all within a social context, we need to develop assessment strategies that reflect the uniqueness of the learner. What might some of these strategies be?

Assessment and Instruction

The main purpose of assessment is to provide you, the teacher, and the student themselves, with information about what was learned and how it was learned. The Assessment Standards (1995) state that "assessment is the link between teaching and learning. As such, it is a dynamic, ongoing, and critical process that shapes classroom environments and students' opportunities to learn. Through assessment, teachers monitor the success of their practice and make instructional decisions"(p. 59).

Assessment, according to Webb and Briars (1990) "must be an interaction between teacher and students, with the teacher continually seeking to understand what a student can do and how a student is able to do it and then using this information to guide instruction" (p. 108). This view is consistent with the Curriculum and Evaluation Standards' proposal that Òstudent assessment be integral to instructionÓ (NCTM 1989, p. 190). Every instructional activity is an assessment opportunity for the teacher as well as a learning opportunity for the student. At a recent NCTM conference, David Clarke, of Melbourne, Australia spoke of the Twin Peaks of instruction and assessment as being parts of the same mountain of curriculum. Clarke maintains that we need to reconcile assessment and instruction, blend them together in a formative way throughout the 'lesson'. Formal assessment, a planned assessment event, often occurring after instruction, does not, according to Clarke (1990), provide the quality of information in a context in which the information can be put to immediate use. On the other hand, informal assessment, the collection of information coincident with instruction, immediately informs instruction, and becomes part of the instructional cycle.

Quality mathematical thinking is what we want our students to have. Mathematical power, a term used in the Curriculum and Evaluation Standards (1989), is indicative of the quality of mathematical literacy sought. The

Teaching Standards (1991) presents a vision of instruction to support the development of mathematical power. Appropriate assessment determines the nature of that mathematical power or mathematical thinking. In order to develop mathematical power in all students, assessment needs to support the continued mathematics' learning of each student. This is the central goal of assessment in school mathematics. When done equitably, assessment of a student's progress will further learning.

Performance Stations

Performance Stations are being developed at present by Saskatchewan Education for Provincial Learning Assessment in Mathematics and also for classroom-based assessment stations. Performance-based assessment is considered authentic because of its relevance and situated context for the student being assessed, because of the match between testing and teaching practices, because it involves active construction of meaning on the part of the student, emphasizes complex thinking skills and enables students to develop and exhibit diverse abilities. Liliane Gauthier, an author of several sets of Performance Stations (available from the Stewart Resource Centre), writes the following two paragraphs at the beginning of each of her compendiums of performance-station ideas.

"Performance stations allow students to either discover or revisit concepts. In discovery stations, students are presented with a problem or a question where they need to decide on strategies to solve the problem. Students discover patterns, relationships or mathematical understandings. In activity stations designed to revisit concepts, students practise skills or use alternate strategies to review concepts.

Performance stations can also be worked in such a way that students can be assessed on their knowledge of concepts and their ability to use what they know in new situations. Performance testing allows students to use strategies that cater to their learning styles. Manipulatives are provided for the hands-on learner. Teachers can follow each student'7s thinking processes by carefully wording questions that enable students to explain their work and to reflect upon what they know and what they have learned."

The following are examples, taken from Liliane's Performance Station compendiums, at each of the grade 6, 7, 8, and 9 levels. Teachers around the province are encouraged to try these tasks at their grade level, obtain the appropriate compendium from the Stewart Resource Centre, and/or design their own performance stations.

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13. Numbers & Operations — Fractions — Gr. 6
N-43

Materials: newspapers
magazines

1. Read through the newspaper to find four items in which fractions are used.

2. Cut these out and paste them on a loose leaf two per sheet.

3. Beside each item, use two to three sentences to explain the fraction(s) which was (were) used in that particular situation.

When you have completed this station,
place your answer sheet in your portfolio.
Label your portfolio entry.

Please tidy up the station.

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21. Geometry/Measurement — Volume — Grade 7

G/M 73a, G/M-74a,
PS-1, PS-1, PS-6

Materials: cm cubes
ruler
paper 20 cm X 25 cm
calculator
scissors
tape

1. Follow the directions below to make a box that will hold the maximum number of cubes.

a) Write the problem in your own words.

b) List your strategies and make a plan.

c) Carry out your plan.

d) Reflect. Did it work? Do you need to go back to b)?

e) Write the maximum number of the cubes that can possibly be held by box formed using a 20 cm x 25 cm piece of paper and explain your reasoning. Use drawings to show what you did.

When you have completed this station,
file your writing and your drawings in your portfolio.
Label your portfolio entry.

Please tidy up the station.

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7. Ratio & Proportion Grade 8

Materials: Real Estate Ads

1. Search the newspapers for advertisements for homes.

2. Find 5 that you would like. Cut these out and paste them on a sheet of paper.

3. Give at least one reason why you chose each one.

4. If the realtor selling these homes receives a commission of 2

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14 Date Management Probability Gr. 9
D-26, D-29

Materials: computer
Calculator (TI-82)

A soft drink company placed a lucky liner in the caps of half of their 1-L bottles. Derek said he bought five bottles and each bottle had a lucky liner int it. How could you use computer generated or calculator-generated random numbers to simulate the situation and find the probability of finding five lucky liners? Explain your strategies and report your findings.

If a computer or a calculator are not available, use another method to design a

simulation to find the probability of finding five lucky liners. Explain your strategies and report your findings.

When you have completed this station,
file your writing and your drawings in your portfolio.
Label your portfolio entry.

Please tidy up the station.

"It is through our assessment that we communicate most clearly to students which activities and learning outcomes we value"(Clarke, 1989, p. 2).

Assessment Resources

A. Teaching Materials from the Stewart Resources Centre:
Performing Stations in Math by Liliane Gauthier at the Grade 6, 7, 8 and 9 levels.

B. From Saskatchewan Education:
Provincial Learning Assessment in Mathematics, Preliminary Report for Grade 5, 8, and .01.

C. From The Ontario Mathematics Coordinators Association:
Linking Assessment and Instruction in Mathematics: Connecting to the Ontario Provincial standards.

D. From the Province of British Columbia, Ministry of Education:
Evaluating Mathematical Development Across the Curriculum and Evaluating Problem Solving Across the Curriculum.

E. From the National Council of Teachers of Mathematics, Reston, Virginia:

- Assessment--Myths, Models, Good Questions, and Practical Suggestions
- Assessment Standards for School Mathematics
- Assessment of Authentic Performance in School Mathematics
- Assessment in the Mathematics Classroom
- Authentic Assessment in Practice: A Collection of Portfolios, Performance tasks, Exhibitions, and Documentation
- The Changing face of Testing and Assessment
- Expanding Student Assessment
- From Gatekeeper to Gateway: Transforming Testing in America
- Guidelines for Assessment Systems
- Making Sense of Testing and Assessment
- Mathematics Assessment: Alternative approaches
- Performance Assessment Sampler: A Workbook
- Redesigning assessment

F. From other sources:
Herman, J.L., Aschbacher, P.R., & Winters, L. (1991). A Practical Guide to Alternative Assessment. Alexandria, VA: ASCD

Kulm, G. (1994). Mathematics Assessment: What Works in the Classroom. San Francisco, CA: Jossey-Bass Publishers.

Obtained from Math Central

http://MathCentral.uregina.ca/