

Assessment for Learning in an Elementary Math Classroom

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A Continuum Towards Differentiated Assessment

(taken from *Success for all Learners: A Handbook on Differentiating Instruction and Assessing Special Students*)

Assessment of Learning (Summative)

- * focuses on the deficits in student learning
- * asks "Has the student achieved the criteria?"
- * happens when learning is over
- * is a source of anxiety for students

- * places the teacher in the position of judge
- * is sometimes an end-of-term surprise for students and parents; sometimes appears arbitrary to students

- * focuses only on products
- * is norm-based at all times; concerned with how a student's performance compares to that of others
- * assesses mainly the things that are easiest to measure: fact based recall

- * uses tests whose content is devoid of context

- * uses a limited number of assessment tools, most of them written products

- * is designed to inform people not directly involved in daily teaching and learning

Assessment for Learning (Formative)

- * demonstrates what students have learned and can do
- * asks "Where is the student on the continuum?"
- * in an ongoing part of learning
- * offers students frequent opportunities to gain descriptive feedback and observe progress
- * is a collaborative process between the teacher and students
- * emphasizes assessment and reporting as a continuous process; students know the expectations clearly, and are involved in the process
- * recognizes the value of processes
- * demonstrates a student's unique abilities and progress

- * uses tools for assessing deep learning, application of knowledge and the development of collaborative skills
- * uses tests that require the application of content and higher level thinking skills in authentic performances
- * uses a wide range of processes and products, including oral and interactive skills

- * is designed to improve learning

Math Assessment: An Achievement and Diagnostic Profile

Good testing practice should be frequent testing practice because you will get a more accurate picture of the students' progress.

Using a **Profile Assessment Tool** is ONE way of collecting information about students' progress that gets them involved in the assessment process. Other assessment strategies must be included to develop a more complete picture of a student's achievement.

1. How to use a Profile Assessment Tool

- a. divide the curriculum into major categories (about 15-20)
- b. on a regular basis, give a test (start as early in the year as possible so students get used to the routine and the format)
 - every test has the same number of questions that you divided the curriculum into
 - each question is always on the same part of the curriculum
- c. students do test, then the teacher marks
- d. the next day, the students graph their results
 - color in the box if they got it right
 - leave the box empty OR put an X if they got it wrong
 - color in half the box if they got half a mark

2. Reading and Interpreting Students' Results Graphs

- a. On the graph, when you look **DOWN** individual columns, you get an **ACHIEVEMENT** profile—how the student did on one particular test.
- b. On the graph, when you look **ACROSS** the rows, you get a **DIAGNOSTIC** profile—after a few tests, strengths and weaknesses will begin to emerge. **THIS IS WHERE THIS FORM OF TESTING IS MOST VALUABLE! THIS IS IMPLICATIONS FOR TEACHING, REMEDIATION & ENRICHMENT!**

If a student consistently has boxes colored in across a particular row, you can conclude that it is an area of strength. On the other hand, if a student consistently has blank boxes across a row, you can conclude that it is an area of weakness and may require remediation.

3. Why This Form of Assessment?

- a. regular assessment and review of all the major categories of the Western Canadian Protocol
- b. provides diagnostic information regarding a student's strengths and weaknesses
- c. students are directly involved in their own evaluation
- d. very visual way of showing a student's progress—great to discuss with parents at interviews and report card time
- e. can be used to analyze a teacher's strengths and weaknesses in his/her teaching of the various parts of the curriculum

Engaging Students in Self-Reflection Using the Profile Assessment Tool

1. For each question have a face-- 😊 😐 😞

Students record how they felt about answering that question.

Happy face—"I understood the question and am confident I got it right."

Straight face—"I didn't fully understand the question and I'm not sure if I got it right."

Sad face—"I really don't get this question and don't think I got it right."

2. After the students have received back the marked test, complete a self-reflection sheet that might look like the one below.

Name: _____ Test #: _____

Problem #	Right	Half	Wrong	Simple mistake	I need help.
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					

Based on this test, to get better, I plan to:

_____ Do some extra practice with Mrs. Braybrook at lunch and write the test again.

_____ Do a better job of listening and participating during the math lessons.

_____ Ask for help when I don't understand something.

_____ Check my work over more carefully because I've made a lot of simple mistakes.

_____ Explain my answers in more detail.

Students then check off one or more of the strategies that they need to do to improve. Any student who wishes to do extra practice with the teacher is then given the chance to re-write the test. Students are not allowed to re-write the test unless they have done the extra practice.

Rubrics

-useful tools to use as *formative* and *summative* assessment

-useful to teachers, students and parents

A good rubric:

1. must describe several qualities of performance
2. usually specifies between 3 and 5 performance levels
3. is clearly stated to help students to know what is expected of them
4. explicitly distinguishes one performance level from another by using descriptors that identify the characteristics of performance at one level that are not present at the level above or below it
5. is usually stated in positive terms to communicate accomplishments rather than deficiencies

(from *NCTM Mathematics Assessment: A Practical Handbook* page 84 & 85)

Useful verbs:

demonstrates	uses	applies	contributes
generates	responds	represents	produces

Useful qualifiers for the highest level of competence:

often	always	strong	insightful
consistently	well-developed	evident	independently

Useful qualifiers for the second level of competence:

usually	suitable	adequate	satisfactory
competent	at times	good	some

Useful qualifiers for the third level of competence:

with support	undeveloped	weak	disorganized
basic	unclear	inconsistent	incomplete

Useful qualifiers for the lowest level of competence:

not evident	unsatisfactory	little evidence of	has limited skill
off topic	even with assistance, student is unable to		muddled

To define the scale, you could use numbers. The scale could be anywhere from 3 points to as many as you want, but usually about 4. It will depend on the task that you are assessing. You could also use scales that include the following:

Distinguished, Proficient, Apprentice, Novice

Exemplary, Proficient, Developing, Emerging

Excellent, Good, Satisfactory, Needs Improvement

Excellent, Awesome, Good, OK

Awesome, Admirable, Acceptable, Attempted

Diamond, Ruby, Garnet, Glass

Butterfly, Cocoon, Pupa, Larvae

Gold, Silver, Bronze, Lead

Home run, 3rd base, 2nd, base, 1st base

Loonie, Quarter, Dime, Penny

Master, Veteran, Apprentice, Novice

Wow!, Right On!, Moving Along, Not Yet

There are some excellent websites on rubrics. A good way to start your search is by typing "math rubrics" although I found a lot of the hits were problem solving rubrics. I have mentioned a couple of the better sites I have discovered here:

www.rubrics4teachers.com

<http://rubistar.4teachers.org>

Example Tasks and Scoring Rubrics

Mystery Amount

Name: _____

Jane has 8 coins in her purse that equal \$0.32. Draw the coins that she could have. (Hint: Look for more than one answer!)

Marking Guide

4	3	2	1	0
Finds and represents more than one correct answer while meeting all criteria from the question.	Finds and represents one correct answer while meeting all criteria from the question.	Finds and represents an answer that only meets one of the criteria from the question.	Attempts to find an answer but it does not meet any of the criteria from the question.	No attempt to find an answer.

Notes: -Could use descriptors instead of number scores)
 -This could be modified and used in division 2.

Writing in Math

Name: _____ Date: _____

Topic: _____

Wow!	Right On!	Moving Along	Not Yet
-demonstrates an in-depth understanding of concept -communicates effectively using appropriate terms -consistently uses math vocabulary correctly	-demonstrates an adequate understanding of concept even though some less important ideas may be missing -communicates in a straight-forward manner -sometimes uses math vocabulary correctly	-demonstrates a basic understanding of concept with some gaps in understanding evident -communicates with sufficient information for task requirements -attempts to use math vocabulary, but does not do so correctly	-demonstrates a fragmented understanding of concept, with significant gaps in understanding evident -communicates with imprecise or disorganized language -does not use any math vocabulary

Notes: -Some of the ideas for this rubric were taken from Math to the Max.
 -This is a very general rubric that could be used for any kind of mathematical writing (eg. math journals) that students do.
 -It could be used at any grade level with some possible modifications necessary.

Representing 2-Digit Numbers Assessment

Name: _____

	Wow!	Right On!	Moving Along!	Not yet
Represents number multiple ways Self→	Shows and describes a two-digit number in more than 10 different ways , including with numbers and pictures.	Shows and describes a two-digit number in 9 or 10 different ways , including with numbers and pictures.	Shows and describes a two-digit number in 7 or 8 different ways . May not include ways with numbers or pictures.	Shows and describes a two-digit number in less than 7 different ways . May not include ways with numbers or pictures.
Accuracy Self→	There are no errors in numbers or representations.	There are less than 3 errors in numbers or representations.	There are 3-5 errors in numbers or representations.	There are more than 5 errors in numbers or representations.
Neatness Self→	The work is presented in a neat, clear, organized way that is easy to read .	The work is presented in a neat and organized way that is usually easy to read .	The work is presented in an organized way but may be hard to read at times .	The work appears sloppy and unorganized . Most of it is difficult to read .

- Notes:
- Some of the ideas for this rubric came from Math to the Max.
 - There is a self-assessment portion to this rubric.

Show and Share Project

This is a project where students are required to pick an object that they love and create a poster (and/or oral presentation) about it. The key is that they must give mathematical facts about their object. The purpose of this project is to get students to realize that math is around us everywhere and that we use it all the time—often without thinking about it.

Show and Share Poster—Div. 2

Name: _____

	Wow!	Right On!	Moving Along!	Not yet
Content Self→	Has more than 8 math facts about object. Facts cover a wide range of math concepts.	Has 8 math facts about object. Facts cover a few different math concepts.	Has 4-7 math facts about object. Facts only cover 2 or 3 math concepts.	Has less than 4 math facts about object. Facts only cover 1 math concept.
Content-- Accuracy Self→	All facts are accurate.	1 or 2 inaccurate facts.	3 or 4 inaccurate facts.	More than 4 inaccurate facts.
Title Self→	Title can be read from 2 meters away and is quite creative.	Title can be read from 2 meters away and describes content well.	Title can be read from 1.5 meters away and describes the content well.	The title is too small to be read from 1 meter and/or does not describe the content well.
Pictures Self→	Has more than one picture that is clear, easy to see and contributes to a better understanding of the object.	Has one picture that is clear, easy to see and contributes to a better understanding of the object.	Has one picture but is unclear and/or difficult to see.	Has not included a picture.
Attractiveness Self→	The poster is exceptionally attractive in terms of design, layout and neatness.	The poster is attractive in terms of design, layout and neatness.	The poster is acceptably attractive although it may lack neatness in some areas.	The poster is distractingly messy or very poorly designed. It is not attractive.
Grammar Self→	There are no grammatical mistakes on the poster.	There is 1 grammatical mistake on the poster.	There are 2 grammatical mistakes on the poster.	There are more than 2 grammatical mistakes on the poster.
Mechanics Self→	Capitalization and punctuation are correct throughout the poster.	There is 1 error in capitalization or punctuation.	There are 2 errors in capitalization or punctuation.	There are more than 2 errors in capitalization or punctuation.

Notes: -This could be modified to suit division 1.

Other Assessment Strategies

Written Work Checklist

- has a variety of skills listed
- only check off when a student has something wrong
- provides more specific details than the Profile Assessment Tool alone

Basic Facts Graph and Reflection

- students complete 1 mad minute each day
- record results on a graph (bar or line—depending on grade level)
- after recording results for 10 days, students complete the following self-reflection

Basic Facts Graph Name: _____

This graph shows that I... _____

List 2 strategies you have used to get better at mad minutes.

1. _____

2. _____

Write a sentence comparing your scores using the word "more".

Write a sentence comparing your scores using the word "less".

Compare and Contrast

- students find similarities and differences between 2 concepts
- looks at higher level thinking skills

Process Notes

- students describe, in writing, the process they went through to solve a problem
- modeling the strategy with the whole class helps students learn new problem solving strategies
- increases metacognition

Learning Logs

- can be used at the beginning, middle or end of a lesson
- could provide students with prompts to help them focus or pose problems and have students reflect on them
- students could use pictures, words or diagrams to explain their thinking
- increases metacognition

Performance Tasks

- used to evaluate those objectives that students must DO things for
 - Eg. create patterns, use base ten blocks, count out loud, use calculators
- break the task down into steps eg. two-digit addition or subtraction
- this helps you see where students are going wrong in the process

Portfolios

- collection of student work
- each piece is chosen for a specific purpose
- shows student competence and growth

Exit Cards

- similar to a learning log but is a card on which the students summarize what they learned after a period of instruction (could be a period, a week of lessons or a unit)
- will show who has the basic facts and who has the ability to apply what has been learned

Examples and Non-examples

- given a specific topic, students identify examples and non-examples of the topic
- must also then explain why each answer is an example or not
- will assess higher level thinking skills

Pictures of Manipulative Work

- take pictures of students working with manipulatives
- the next day, have students write a summary of the math concepts that were being practiced in the picture
- could be included in a portfolio

Other ideas??

A good website for other assessment tasks is the Alberta Assessment Consortium at www.aac.ab.ca

A good source of information regarding the teaching and assessment of math is the National Council of Teachers of Mathematics website at: www.nctm.org

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To view online go to www.stenhouse.com , type "Fair Isn't Always Equal" or "Wormeli" into the search space at the top of the home page. Click on "More details" and scroll down to see the table of contents. Each chapter is viewable as a PDF file.