



Chapter Three

Assessing math projects

As the objectives and methods of math teaching change, forms of assessment must change too. It is through assessment that we as teachers can validate the effectiveness of our instruction and evaluate our students' understanding of mathematics. Assessment should always be viewed as an essential part of the learning process and should involve both you and your students.

You may choose from a variety of tools when assessing your students' work on projects, including observation logs, checklists, and point systems. Because these assessment methods are flexible, you can tailor them to meet your needs. Combining the assessments of projects with the tests and quizzes of the general curriculum can give you a detailed profile of your students' overall achievement in your class.

Observation Logs

As you move around the classroom during project work, you may observe students working individually or in groups. Writing down your observations will provide you with a permanent record of their

INDIVIDUAL OBSERVATION LOG

Name _____ Section _____
Project _____

Date	Comments

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GROUP OBSERVATION LOG

Names _____

Section _____

Project _____

Date

Comments

Date	Comments

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progress. A practical way to do this is to use either the "Individual Observation Log" or the "Group Observation Log," each of which is provided.

To reduce your workload to a manageable level, plan to observe only five to ten students per day in each class. Attach individual log sheets to a clipboard, and carry it with you around the room, focusing your attention on the students you wish to observe that day.

When completing the logs, you may record items that indicate mathematical thinking, understanding of concepts, insights, or reflections. You might also note behavior. Selecting two or three skills or behaviors to concentrate on reduces the chances you will feel overwhelmed with things to look for. It is helpful to develop your own system of shorthand using abbreviations, codes, and phrases—for example:

- Identify names with initials. John becomes *J*.
- Abbreviate frequently used words. Excellent is *ex*, good is *g*, fair is *f*, well is *w*, strategy is *strat*, work is *wk*, process is *proc*, question is *quest*, group is *gp*, illustrate is *il*, problem is *prob*, needs improvement is *ni*.
- Use phrases rather than full sentences whenever possible.

Here is a sample entry on an individual log: "Wked w with gp. Offered sketch to il prob."

Conferences provide a fine opportunity to gain an understanding of your students' growth in mathematics. Simply talking to students about the project they are working on can give you insight into their thoughts and feelings about math.

While you can learn much about your students when they ask you questions, you can also pose specific questions to your students that will help show their understanding of math. Such questions may focus on comprehension of problems, formulation of strategies, procedures, calculations, justification of solutions, relationships between ideas, or group cooperation. Having a list of questions prepared ahead of time can help you zero in on points you wish to address. Since many of the students in a class frequently share the same problems and concerns, asking a few students the same questions will often provide information about the class's general thinking. See "Possible Assessment Questions" for a list of questions that you can ask during observations and conferences.

Checklists

Checklists are another useful tool for observation. Unlike an observation log in which you write notes detailing the progress of students, a checklist is an assortment of predetermined skills and behaviors. As you observe one of the skills or behaviors on your list for a particular student, you simply check it off. As with the observation log, it is practical to select five to ten students per day in each class on whom to focus your attention. While a checklist may include numerous

Possible Assessment Questions

Asking students questions about their work can provide you with valuable insight about their progress. The following questions are just some of the possibilities:

- What is this problem asking? How would you explain it to a friend?
- What must you find before you can come up with a solution?
- How are the facts of this problem connected? How does one fact relate to another?
- Is there any information in this problem that you do not need? What is it, and why is it not needed?
- Is there any information missing in this problem that is necessary to solving it? How would you go about finding it?
- What strategies might you try to solve this problem? Which do you think is the best one? Why?
- Can the information or facts presented in this problem be arranged in a pattern? In what way? How might that pattern help you solve the problem?
- Would drawing or sketching help you to solve the problem? If yes, how?
- How might you share your understanding of the problem with your group?
- How might your group divide tasks in solving this problem?
- How might your group work more effectively?
- What is the best solution to the problem?
- How can you justify your solution?

Grading Projects Using a Point System

Following is an example of how a project's parts can be broken down and quantified. The total number of points is 100. You may use this system or design one of your own.

Outcome/Action/Behavior	Points
<i>Satisfactory solution</i> The solution is valid and practical.	25
<i>Justification of results</i> Students justified results through an oral presentation, written report, or discussion. They backed up the results with sound arguments.	15
<i>Methods</i> Students eliminated impractical procedures and focused their efforts on the most useful. If necessary, the students eliminated and found data. They were able to analyze and organize information and use technology where applicable.	15
<i>Accuracy</i> Reasoning and computation were logical and accurate.	15
<i>Creativity</i> Students showed original or insightful thinking.	10
<i>Persistence</i> Students did not give up.	10
<i>Cooperation with group</i> Students worked well together, shared ideas, and listened to the ideas of each other. They showed a willingness to help each other.	10

Suggestions for Grading Writing in Math Class

Grading the writing of students in math can be new territory for many teachers. The following ideas can help.

- Focus evaluation on content rather than mechanics.
- Offer comments and responses directly on student papers whenever possible.
- Keep comments positive. Offer specific suggestions for improvement.
- Comment on only one or two points. Mentioning more may only confuse or discourage students.
- Encourage students to edit each other's writing and revise their work before handing it in.
- Work with your students' English teacher in promoting effective writing techniques.
- Discuss with your students what you will be looking for during evaluation.

Following is a model for scoring student writing, based on percentages:

- *Focus*: The topic is clearly defined. All ideas support the topic. 20%
- *Content*: The student uses fresh, insightful, or original ideas. The topic is developed and supported with details. Mathematical reasoning is sound and shows an understanding of concepts. 25%
- *Organization*: The piece progresses logically from beginning to end. An introduction, body, and conclusion can be identified. 25%
- *Style*: The writing is appropriate for the topic and audience. Ideas are communicated effectively. There is a distinct voice. 15%
- *Mechanics*: The writer uses correct punctuation, grammar, and spelling. 15%

Self-Assessment

A successful math class in which learning is vigorously pursued is a place of continuous assessment on the parts of both teachers and students. While virtually all students expect their learning to be evaluated by their teachers, few have ever been asked to assess themselves. Self-assessment is perhaps the most valuable of any form of evaluation.

You should encourage your students to assess themselves. A good place to record thoughts about personal growth in math is in math journals. At the end of a project, ask your students to write a journal entry about the project. Suggest that they include the strategies they used, problems they encountered, and what they learned from the project.

If you prefer, you may distribute copies of the "Student Self-Assessment." Having students answer the questions on the assessment will help them to evaluate their own work and learning. (See Project 60 for a comprehensive assessment that may be applied to the entire year.)

While we as teachers continuously evaluate the efforts of our students, it is helpful for us to step back occasionally and assess ourselves. This is particularly true for teachers who are implementing projects for the first time. At the very least, you should assess yourself by considering what went well and what you would do differently next time. Asking yourself the questions contained in the "Teacher Self-Assessment" can be most helpful.

Conclusion

Assessment clearly is an essential part of the program of any classroom, with the purpose of promoting and assisting learning. It should be continuous and effective.

Student Self-Assessment

Name _____ Date _____ Section _____

Project _____

To evaluate your work and what you have learned during this project, answer the following questions.

1. What did I like about this project? _____

2. What did I not like about it? _____

3. What strategies did I use to solve the problem? _____

4. Could I have used other strategies? If yes, which ones? _____

5. Did I justify my solution sufficiently? Could I have provided more proof? How?

6. What did I learn during this project?! _____

Teacher Self-Assessment

Honest answers to the following questions can help ensure that your next project will be even more successful.

- Did I present the project clearly? If not, how might I make it clearer?
- Did the students understand what they were supposed to do? How might I help them understand better?
- Did I arrange the classroom appropriately? What could I change to make the classroom more conducive to project work?
- Were the students organized in effective groups? Who would I change?
- Did I monitor students effectively? Do I know what each student learned?
- Did I ask appropriate questions that provided guidance without giving away answers? What was my best question? What was my least effective?
- Did I provide enough time for sharing and discussion upon conclusion? If not, how might I arrange more time in my schedule?
- What would I do differently to improve this project?