Write reflectively in mathematics and science

using reflective writing to build understanding, clarify ideas and set learning goals in mathematics and science

Learning outcomes

- understand the purpose of reflective writing in mathematics and science
- use various techniques to write reflectively in mathematics and science

When to use the strategy

- understanding a mathematics or science challenge, problem, concept or situation
- explaining a problem-solving or investigation process
- justifying a solution or explanation
- monitoring your own learning progress and set learning goals
- making connections between new and previous learning

How to use the strategy

Prior knowledge

- background mathematical or scientific concepts

Ideas to emphasize

- Writing helps consolidate new learning.
- Writing about mathematics and science helps us see connections and solve problems.
- We can use specific techniques to make reflective writing more useful.
- Reflective writing is an important part of learning mathematics and science.

Instructional suggestions

- Ensure that students understand what is meant by reflective writing.
- Brainstorm a variety of possible reflections on a recent lesson or topic.
- Sort the reflections into helpful/not helpful.
- With students, develop criteria for helpful reflective writing (e.g. insightful, specific, constructive).
- Give students an opportunity to practise reflecting orally before asking for a written response.
Write reflectively in mathematics and science

using reflective writing to build understanding, clarify ideas and set learning goals in mathematics and science

Purpose

This strategy uses reflective writing to help build my understanding of mathematics and science concepts and make plans to achieve my learning goals.

Instructions

• Ask yourself Why? Will writing help you:
  – build deeper understanding?
  – think through different ways to solve a problem?
  – explain a solution method?
  – justify a solution or explanation?
  – decide what to do next?
  – understand personal feelings about learning mathematics and science?
  – achieve a goal not listed above?

• Ask yourself “What?” and record your basic observations of the mathematical concept or situation. For example:
  – What are you learning about in math or science?
  – What did you do or observe during the lesson(s)?
  – What are some specific examples of a concept, problem or task in this topic?

• Ask yourself “So what?” and add insights and connections. For example:
  – What connections can you make with previous math or science learning?
  – How confident do you feel about your understanding of this topic?
  – What parts of the topic are still unclear?

• Ask yourself “Now what?” and consider what this means for your future learning in mathematics or science. For example:
  – What have you learned?
  – What do you wonder about now?
  – What will you do next?

• Review your reflection to check that it meets the criteria below.

Criteria for reflective writing

Specific: accurately records key ideas and events in appropriate detail.

Insightful: links new learning with previous knowledge.

Constructive: includes feasible steps toward learning goals.
Writing reflectively in mathematics and science

Use reflective writing to build understanding, clarify ideas and set learning goals in mathematics and science.

Topic: ____________________________________________

1. **Why?** Identify your purposes(s) for reflecting.
   - Why might it be helpful to reflect on this topic?
   - Check all the purposes that apply.
     - Build deeper understanding
     - Think through different ways to solve a problem
     - Explain a solution method
     - Justify a solution
     - Decide what to do next
     - Understand personal feelings about learning mathematics or science
     - Other:

2. **What?** Record basic observations about the concept or situation.
   - What are you learning about in math/science?
   - What did you do or observe during the lesson(s)?
   - What are some specific examples of a concept, problem or task in this topic?

3. **So what?** Revisit the topic and add your own ideas.
   - What connections can you make with previous math or science learning?
   - How confident do you feel about your understanding of this topic?
   - What parts of the topic are still unclear?

4. **Now what?** Consider what you may have learned or need to learn.
   - What have you learned?
   - What do you wonder about now?
   - What will you do next?

**Criteria for reflective writing**

- **Specific:** accurately records key ideas and events in appropriate detail.
- **Insightful:** links new learning with previous knowledge.
- **Constructive:** includes feasible steps toward learning goals.
## Assessing reflective writing in math and science

Note: This assessment rubric should be based on more than one example of a student’s work.

### Specific

<table>
<thead>
<tr>
<th>Evidence:</th>
<th>Excellent</th>
<th>Very Good</th>
<th>Competent</th>
<th>Basic</th>
<th>Not Yet Able</th>
</tr>
</thead>
<tbody>
<tr>
<td>Records many key observations and ideas, relevant to the purpose of the reflection, with an appropriate level of detail.</td>
<td></td>
<td></td>
<td></td>
<td>Few observations or ideas recorded.</td>
<td></td>
</tr>
</tbody>
</table>

### Insightful

<table>
<thead>
<tr>
<th>Evidence:</th>
<th>Excellent</th>
<th>Very Good</th>
<th>Competent</th>
<th>Basic</th>
<th>Not Yet Able</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thinks deeply and insightfully about mathematical and scientific ideas; identifies important connections.</td>
<td>Thinks about key ideas and identifies some possible connections.</td>
<td>Explores some aspects of the topic; identifies few connections.</td>
<td>Describes only obvious aspects of topic; does not show extended thinking.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Constructive

<table>
<thead>
<tr>
<th>Evidence:</th>
<th>Excellent</th>
<th>Very Good</th>
<th>Competent</th>
<th>Basic</th>
<th>Not Yet Able</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consistently identifies recent learning and thoughtfully develops constructive and reasonable options for moving forward.</td>
<td>Often identifies recent learning and develops reasonable options for moving forward.</td>
<td>Identifies recent learning and develops some options for moving forward.</td>
<td>Shows some awareness of recent learning; is unclear about steps for moving forward.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>