

REVISING KNOWLEDGE

CLASSROOM TECHNIQUES TO HELP STUDENTS EXAMINE THEIR DEEPER UNDERSTANDING

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Revising Knowledge

Revising knowledge to help students examine their deeper understanding of critical content is an instructional strategy comprised of multiple discrete cognitive processes that includes: 1) reviewing prior knowledge; 2) identifying and correcting mistakes, misconceptions or misunderstandings; 3) identifying gaps in knowledge; 4) amending prior knowledge; and 5) explaining the underlying reasons for specific knowledge revisions. Each of these aspects of revising knowledge, when directly taught to and modelled for your students, has the potential not only to deepen their content knowledge but also enhance their memory and problem-solving abilities related to critical content.

The process of revising knowledge is not confined to classrooms or schools. Individuals at every age and stage of development are constantly revising their prior learning by correcting errors and misconceptions, as well as adding new information. The difference between this almost unconscious ongoing learning process and the revising knowledge strategy is this: you, the classroom teacher, must intentionally teach and model the process for students to ensure that they acquire critical content knowledge.

There are two types of knowledge: declarative and procedural. Declarative knowledge is informational in nature, while procedural knowledge involves strategies, skills and processes. The discipline of cognitive psychology describes the process of how individuals acquire knowledge using two terms: *schema* and *schemata*. Schema is thought to be the structure of how concepts are stored in memory, and schemata represents how those concepts are organised based on our experience and others' perspectives. There are three types of schema development, and they are directly related to revising knowledge:

- Accretion is the addition of new knowledge into existing memory.
- Tuning the schema evolves to become more consistent with experience.
- Restructuring is when new information does not fit into the current schema and results in the reorganising or creation of new schema (Marzano, 2007).

Figure 1.7 enumerates the learning activities that must precede students' recording and representing new knowledge in a revision template or interactive notebook. Recall from the introduction that to revise knowledge, students must have some prior knowledge in terms of facts, ideas, concepts or procedures. The following sequence is meant to be illustrative, not definitive. The content and your students dictate the time span of the various parts of the sequence.

Figure 1.7: Sequence of Learning Activities

Day	Learning Activity Sequence
Part 1	The teacher begins a new unit of content with a preview activity and follows that with an initial presentation of a critical content chunk.
Part 2	The teacher stops after a "chunk" to give students a task to do with a partner or group to Process/Elaborate on and Record/Represent their understanding of the new content. Ideally, teachers will engage students in PER between each new chunk of information.
Part 3	Repeat the above cycle until all of the critical chunks of content for a lesson or unit are introduced.
Part 4	Have students review the critical content chunks they learned in the previous lesson. Then, assign a "content activity" to help students deepen their understanding and/or practise skills, strategies or processes. These activities are often more challenging and ongoing projects during which the teacher gradually releases control of learning to students. Purposeful homework may be assigned if appropriate.
Part 5	Only after students have had adequate time to practise what they learned or deepened their understanding should they be expected to revise their knowledge.

Common Mistakes

The implementation of a new technique can often result in unanticipated mistakes. However, knowing ahead of time where problems might arise will increase your likelihood of success in implementing this technique. Watch out for these common mistakes when you teach students how to revise their prior learning using the basics:

- The teacher fails to take the time needed to plan and implement the various learning activities that are prerequisites to revising knowledge.

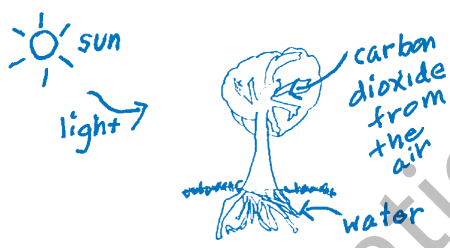
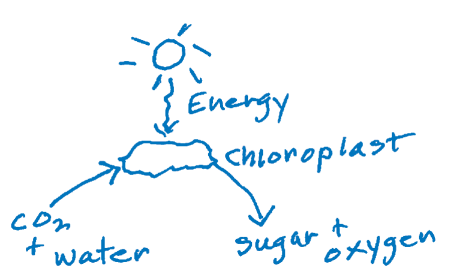
Good morning! Yesterday we read the book **A Tree Is a Plant**, and we learned a lot of facts about trees. I am going to read the book to you again today, and I would like you to listen carefully for the details the author uses to describe a tree. Remember that a detail is a fact. Every time there is a new detail, I am going to stop and ask you to draw a small picture that you think represents that detail. You can use your academic notebook for your pictures. When we are finished, you will hand in your notebooks.

The following week, the teacher hands back the academic notebooks to the students and begins her lesson. Remember the book we read last week, **A Tree Is a Plant**? When I read the book, I asked you to draw pictures of the important details about a tree that you heard in the book. Today, you are going to work with your partner and retell the story using the pictures you drew in your academic notebooks. After each of you has had a turn to retell the story, I would like you to use what you learned from your partner to add more details to your pictures.

Primary Non-Example of Revising Knowledge Using Academic Notebooks

The primary non-example teacher uses the same standard and text exemplar with his foundation-year students. He has students draw pictures in their academic notebooks of the important details they learn about trees. Several days later, the students are shown a video about the characteristics of trees. The teacher does not have them go back to their academic notebooks to revise their picture notes from the week before based on the learning from the video. Opportunities for learning diminish if students do not revise knowledge after each deepening and/or practising activity.

Figure 3.6: Sample Content Vocabulary Notebook: Photosynthesis

Meaning of the Term in My Own Words	My Visual Representation of the Term
<p>Photosynthesis is something that happens in trees and plants. It involves water and air and sunshine. Chlorophyll in the leaves is also part of the process. The water gets to the trees and plants through their roots.</p>	 <p>A hand-drawn diagram of a plant. At the top left, a sun is drawn with rays, labeled 'sun'. An arrow points from the sun to the plant, labeled 'light'. On the right side, an arrow points from the text 'carbon dioxide from the air' to the leaves of the plant. At the bottom, an arrow points from the text 'water' to the roots of the plant.</p>
<p>After Reviewing My Prior Definition</p>	<p>After Reviewing My Previous Visual</p>
<p>There are lots of chemical reactions going on during photosynthesis so I need to know more biology and chemistry to understand photosynthesis.</p>	$6\text{H}_2\text{O} + 6\text{CO}_2 \xrightarrow{\text{Sunlight}} \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$ <p>water + carbon dioxide $\xrightarrow{\text{Sunlight}}$ glucose + oxygen</p>
<p>After Reviewing My Prior Definition</p>	<p>After Reviewing My Previous Visual</p>
<p>Photosynthesis is how plants make their food. Photosynthesis is needed for life on earth. When we eat plants, we use the glucose. The oxygen that is released in the process goes into the air for us to breathe.</p>	<p>The reactants are water and carbon dioxide. The products are glucose and oxygen.</p> <p><u>Reactants</u> water and carbon dioxide <u>Products</u> glucose and oxygen</p>
<p>My Final Definition of the Term</p>	<p>My Final Visual Representation</p>
<p>Photosynthesis is the process through which plants make their own food. It's important to use the word process to define photosynthesis. A <u>process</u> is a series of things that happen in nature. Photosynthesis happens in the chloroplast, an organelle.</p>	 <p>A hand-drawn diagram of a chloroplast. At the top, a sun is drawn with rays, labeled 'Energy'. An arrow points from the sun to the chloroplast. On the left side, an arrow points from the text 'CO2 + water' to the chloroplast. On the right side, an arrow points from the chloroplast to the text 'sugar + oxygen'.</p>

Instructional Technique 5

REVISING KNOWLEDGE USING WRITING TOOLS

Revising knowledge using various writing tools should not be confused with the process of revising written work in English Literacy classrooms. The writing tools to be used for revising knowledge are the means to a much different end than the revision process in English Literacy. The purpose of revision in English Literacy is to improve and polish a specific product, acquiring procedures to write to various prompts and revise to perfection.

The purpose of writing in the context of revising knowledge is not for students to produce polished essays, but wrestle with words and ideas to figure out what they know and do not know, and then seek out additional knowledge. This is not to say that increased opportunities to revise knowledge through the process of writing will not gradually improve the writing skills and fluency of even the most reluctant writers. In fact, the students most likely to benefit from this technique are those who have a great deal to write about, but need some tools to guide them as well as permission to focus more on the revision of knowledge and less on grammar, spelling and writing techniques. A phrase that is sometimes used in discussions about the reading/writing connection is *writing in the service of reading comprehension*. That phrase describes what happens when students write about something they have read: their understanding or reading comprehension improves, sometimes dramatically. However, in the context of revising prior learning, you will teach and model for students the use of *writing in the service of deepening their content learning*.

Scaffolding and Extending

Meeting the needs of the diverse students in your classroom requires that you adapt your instruction. Here are some ideas for scaffolding and extending your instruction.

Scaffolding

When you are having difficulty with one or a small group of students who do not seem to be able to revise their understanding through writing, it may help to do the following:

- Model the processes of summarising and concluding using easier content.
- Make sure you have identified the “must haves” that need revision. The must haves can be defined as the absolutely non-negotiable parts of the standard being taught.
- Select just one piece or part at a time for revision in written form. Do not overwhelm students.
- Use the shorter writing processes such as quick-writes and sentence stems.
- Provide a reference booklet that contains frequently used vocabulary or spelling of the words involved with the unit learning goal and subject to be revised.
- Write out sentence starters and/or prompts for revision. Such starters may be “I understand there is a difference between obtuse and right angles and that difference is _____.”

Extending

There are many creative ways to extend knowledge using writing as a tool for revision:

- Suggest students create self-generated assessments as described earlier.
- Ask a small group of accelerated students to create multiple-choice assessment tasks for each other or the class.