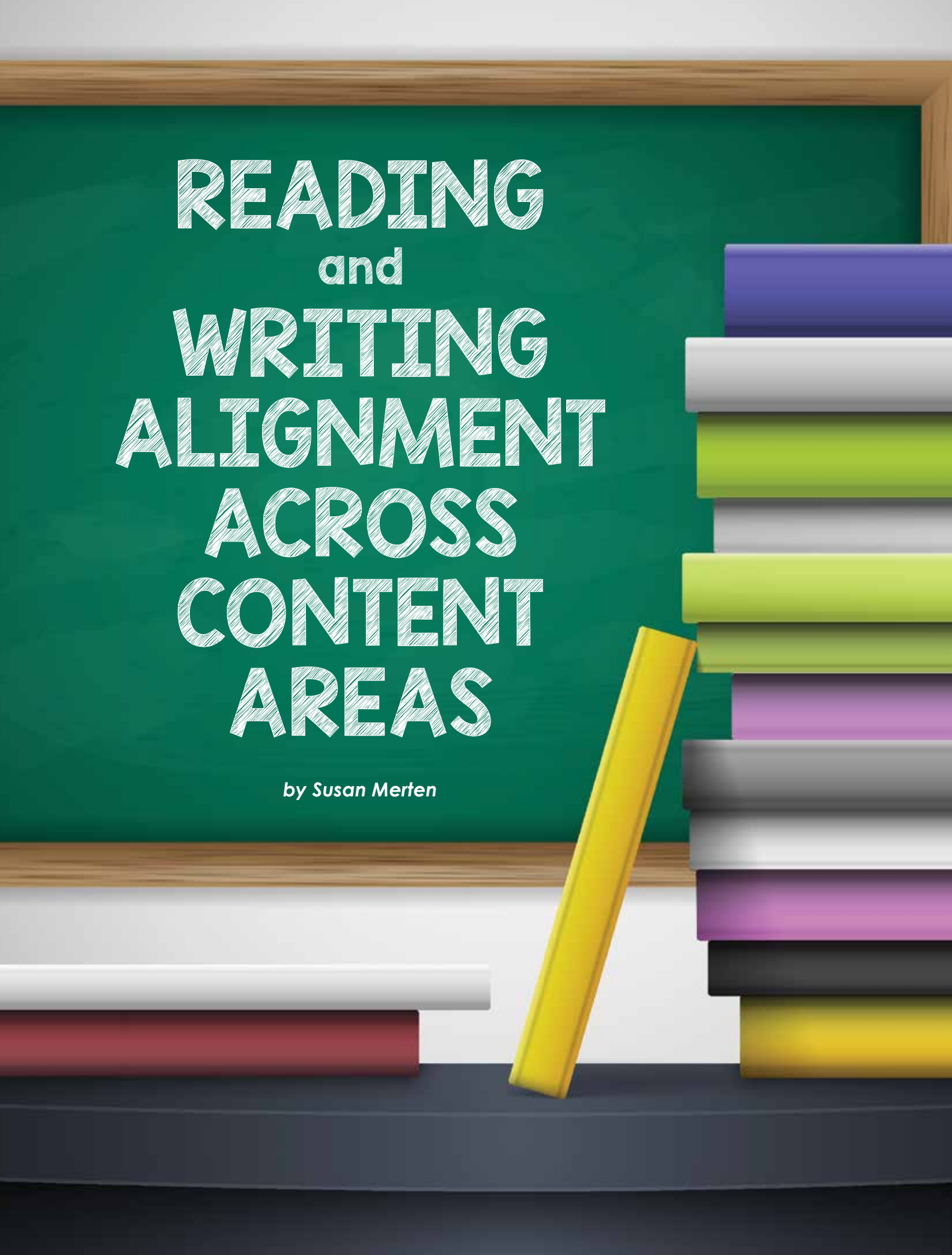
READING and WRITING ALIGNMENT ACROSS CONTENT AREAS

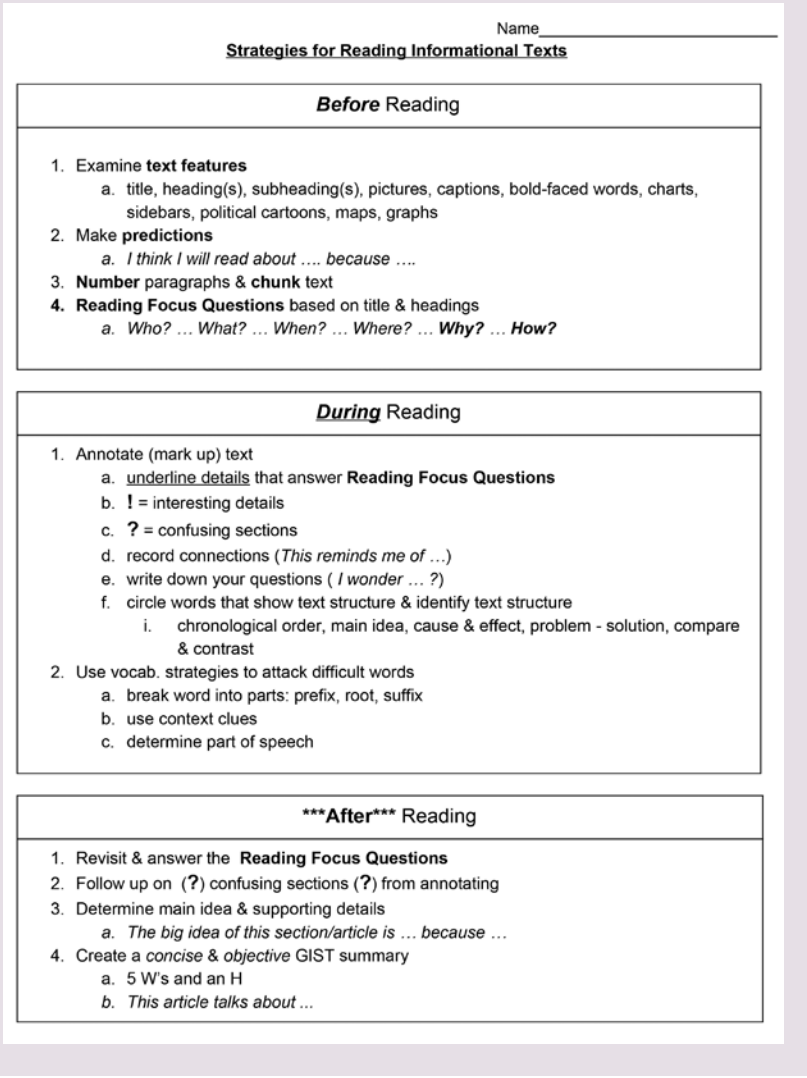
by Susan Merten



All middle school teachers are affected by limited class minutes due to school schedules, the emphasis on integrating new standards into the curriculum, and planned or unforeseen interruptions during the day. As a result, there never seems to be sufficient time during the school year to develop students into the strong expository writers that science and social studies teachers long for. To address this problem, a team of science and social studies teachers at our school collaborated with the English language arts (ELA) teacher to align the literacy requirements of our science and social studies instruction with the reading and writing curriculum for students in our upper middle school (uMS) seventh- and eighth-grade classes.

In recent years, incorporating the *Common Core State Standards* (*CCSS*) into ELA and other content areas has been an ongoing focus at our school, as well as in many other school systems. Our team of teachers selected expository writing as our key focus for *CCSS* integration into science and social studies during this academic year. *Expository writing* is the genre of "writing to inform" or explain (NGAC and CCSSO 2010). On the basis of student content-writing evidence from previous years, content-area teachers noticed students did not easily transfer ELA writing skills into their content-area writing. Students had difficulty using appropriate organization, evidence, style/voice, and standard English conventions expected in content writing.

FIGURE 1 "Reading & Annotating Informational Text" guideline



Name_____

Strategies for Reading Informational Texts

Before Reading

1. Examine **text features**
   a. title, heading(s), subheading(s), pictures, captions, bold-faced words, charts, sidebars, political cartoons, maps, graphs
2. Make **predictions**
   a. *I think I will read about …. because ….*
3. **Number** paragraphs & **chunk** text
4. **Reading Focus Questions** based on title & headings
   a. *Who? … What? … When? … Where? …* ***Why?*** *…* ***How?***

During Reading

1. Annotate (mark up) text
   a. underline details that answer **Reading Focus Questions**
   b. **!** = interesting details
   c. **?** = confusing sections
   d. record connections (*This reminds me of …*)
   e. write down your questions (*I wonder … ?*)
   f. circle words that show text structure & identify text structure
      i. chronological order, main idea, cause & effect, problem - solution, compare & contrast
2. Use vocab. strategies to attack difficult words
   a. break word into parts: prefix, root, suffix
   b. use context clues
   c. determine part of speech

After Reading

1. Revisit & answer the **Reading Focus Questions**
2. Follow up on (**?**) confusing sections (**?**) from annotating
3. Determine main idea & supporting details
   a. *The big idea of this section/article is … because …*
4. Create a *concise* & *objective* GIST summary
   a. 5 W's and an H
   b. *This article talks about …*

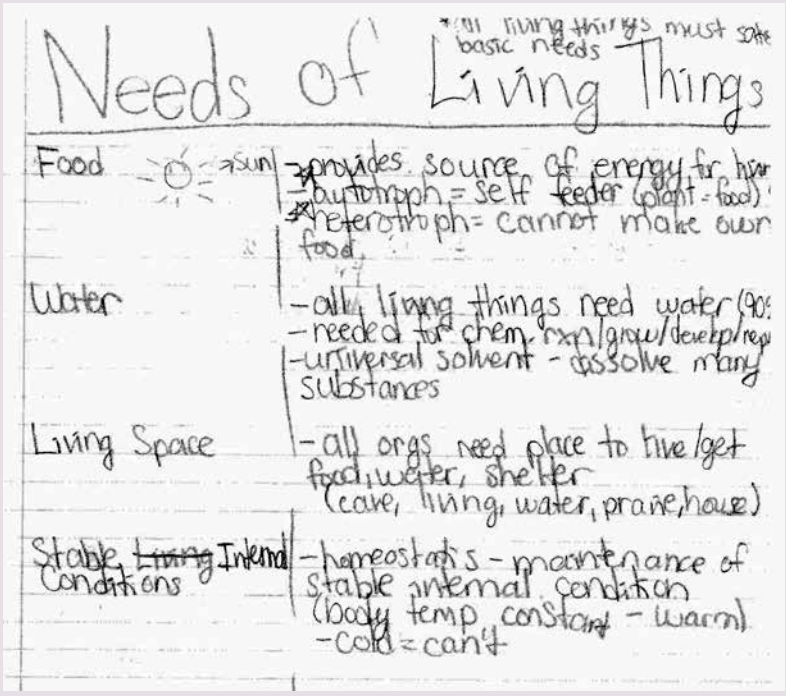
IMAGES COURTESY OF THE AUTHOR

If science teachers without ELA support are interested in incorporating *CCSS* for reading or writing into their curriculum, they can begin by reviewing the *CCSS* website to access links dedicated to science and technical reading and writing (see Resources). Teachers should select a limited number of standards that can be logically incorporated into the science curriculum and assessed.

Content-focused topics for expository writing can be harvested from several sources. One resource may be the essential question or coaching questions developed within units. *Essential questions* are overlying unit questions, such as "How can one explain the structure, properties, and interactions of matter?" (in a Structure and Properties of Matter unit). *Coaching questions* are those that may lead a mini-lesson within a unit. For example, within a Structure and Properties of Matter unit, the coaching question "What characteristics distinguish one substance from another?" was used as a prompt for students describing matter in a short essay. The essay required a definition of matter, a description of the physical properties of matter, and a list of chemical properties that incorporated evidence from a lab investigation.

Another resource for unit questions appropriate for expository-writing topics can be found within the *Next Generation Science Standards*'s Storylines (NGSS Lead States 2013). The *NGSS* Storylines introduce specific

FIGURE 2 Student sample of Cornell notes: Needs of living things



content areas for physical, life, or Earth and space sciences within the grade bands (K–5, middle school, high school). Also, many of the *NGSS* individual performance expectation (PE) statements within both topic and disciplinary core idea (DCI) arrangements lend themselves to expository-writing assessments. For example, PE MS-PS1-3, found within both topic arrangement (Structure and Property of Matter) and DCI (Matter and Its Interactions), expects students to be able to "Gather and make sense of information to describe that synthetic materials come from natural resources and impact society" (NGSS Lead States 2013). In this case, the PE indicates students would need to draw on *CCSS* informational reading strategies to gather and evaluate informational text during research, as well as synthesize information prior to communicating their ideas by using expository-writing skills.

Teachers can also create their own expository-writing assessments using *NGSS* science and engineering practices (SEPs) that support writing, such as Constructing Explanations, Engaging in Argument from Evidence, and Obtaining, Evaluating, and Communicating Information (NGSS Lead States 2013). Likewise, *NGSS* crosscutting concepts that align with a particular PE are another source for writing topics.

The processes described in this article can be used to support any type of three-dimensional instruction in the science classroom, as advocated for by the *NGSS*.

Laying a foundation for expository-writing skills

Before we could coach our students in the expository-writing process, our uMS team realized content-area teachers would first need to show students how to approach reading informational text. By practicing the skills of reading and analyzing informational text, students learn to identify key ideas and provide supporting evidence, just as they would during an ELA class. Within informational text, students can be prompted to identify topic sentences, paragraph/text organization, style/voice, and other expository-writing components.

To facilitate instruction for our students, the ELA teacher shared with content teachers "Reading & Annotating Informational Text," a strategy she developed to assist content teachers in their classes and maintain consistent expectations for students when reading informational text (Figure 1). Student instruction for Reading & Annotating Informational Text begins early, during the first quarter (weeks 2–3) of the school year, in both science and social studies classrooms. Using the Reading & Annotating Informational Text strategy, students begin practicing ELA annotation skills, such as creating questions from headings, numbering paragraphs, and underlining or highlighting key terms and phrases from content text. This is also an area where differentiation can be implemented by offering students different levels of reading complexity when available. Continued practice and application of reading and annotating informational text occurs throughout the academic year in science and social studies classes.

Annotating informational text becomes a natural segue for creating science notes. Our students are

taught to take Cornell notes in science class (see Figure 2 and Resources), a method of note taking particularly suited to science content and study. The Cornell notes technique features key terms or central ideas on the left third of a note page, with supporting details of the key idea(s) on the right two-thirds of the page. The Cornell notes concept is to restrict the amount of student writing on the left side of the page, making it easier to locate key ideas/terms. Also, the vertical spacing between key ideas on the left allows students to add graphics, questions, or anecdotal comments. The right side of the page, containing supporting details, can be easily covered for study or review.

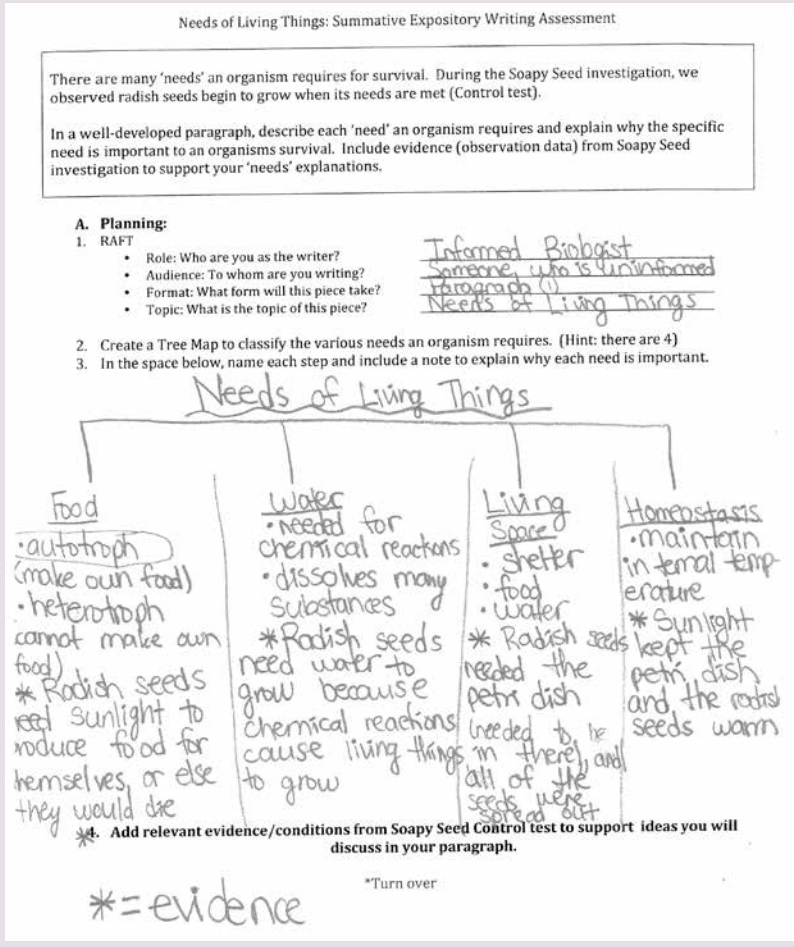
Students are taught the Cornell notes setup as a whole class through direct instruction during week 2. To apply Cornell note-taking strategies, students read aloud, or sometimes silently, a short passage from a text or web article. The teacher guides whole-class student discussion to determine key ideas from the text, plus any supporting details. A model of the notes is written on the board (traditional, interactive, or overhead projector) in Cornell style, which students copy and record in their notebook. A quick walk around the classroom while students are copying notes allows the teacher to monitor students' Cornell notes setup and provide feedback to students who may need redirection.

Throughout the school year, Cornell notes are employed during science class, whether during whole-class/direct instruction (using teacher-provided notes), independent small-group work, or individual note completion assigned for homework. For follow-up or content review, whole-class Cornell notes written by the teacher can be projected on the board or overhead to assist students who may have missed important details in their own reading. Available teacher-prepared, hard-copy notes can provide students who struggle with board-to-paper transitions an opportunity to copy notes from a desktop copy and help students who were absent. Finally, Cornell notes can be referred to for an oral or written formative assessment from student notes. Notebooks are not collected or graded, but a student-created summary statement at the end of the note section can act as a tool to check for student understanding. This strategy could be used as homework, entry work, or exit ticket and will inform the teacher whether students are identifying the text's key ideas and supporting details or whether further instruction is necessary.

Expository writing in the science classroom

Once strategies to read informational text and take notes are taught, the focus turns to expository writing. Students begin by writing a well-developed paragraph related to lessons being taught in their science classes. A formative writing assessment collected early during the first quarter also provides a baseline writing assessment. For example, during a science-literacy unit, eighth graders respond to the question "Why study science?" for a formative-assessment writing piece

FIGURE 3 Student sample of prewrite: Needs of living things



Needs of Living Things: Summative Expository Writing Assessment

There are many 'needs' an organism requires for survival. During the Soapy Seed investigation, we observed radish seeds begin to grow when its needs are met (Control test).

In a well-developed paragraph, describe each 'need' an organism requires and explain why the specific need is important to an organisms survival. Include evidence (observation data) from Soapy Seed investigation to support your 'needs' explanations.

A. Planning:
1. RAFT
   - Role: Who are you as the writer? Informed Biologist
   - Audience: To whom are you writing? someone who is uninformed
   - Format: What form will this piece take? Paragraph ()
   - Topic: What is the topic of this piece? Needs of Living Things
2. Create a Tree Map to classify the various needs an organism requires. (Hint: there are 4)
3. In the space below, name each step and include a note to explain why each need is important.

Needs of Living Things

Food
- autotroph (make own food)
- heterotroph cannot make own food)
* Radish seeds need sunlight to produce food for themselves, or else they would die

Water
- needed for chemical reactions
- dissolves many substances
* Radish seeds need water to grow because chemical reactions cause living things to grow

Living Space
- shelter
- food
- water
* Radish seeds needed the petri dish (needed to be in there) and all of the seeds were spread out

Homeostasis
- maintain internal temperature
* Sunlight kept the petri dish and the radish seeds warm

4. Add relevant evidence/conditions from Soapy Seed Control test to support ideas you will discuss in your paragraph.

*Turn over

*=evidence

(Figure 3). Expository writing is introduced, taught, and assessed in science classes during the first quarter, and it continues within content areas throughout the academic year. Teacher support will probably be needed during the assignment introduction to clarify each writing task and encourage prewrite planning strategies. Once students understand the expository-writing expectations, their drafting, editing, and revision practices (supported with worksheets, checklists, and the expository-writing rubric) will be the primary guideline. Students may need stronger support during quarters 1 and 2 as they practice breaking down the writing task, developing topic sentences, finding evidence to support ideas, adding comments, and using appropriate voice in expository writing.

To assist and support science teachers at our school, the ELA teacher brainstormed and coached content teachers in developing expository-writing assignments and reviewed preliminary assessments. Using an ELA Writing Plan template, science teachers at our school were able to create expository-writing assignments that guide student writing and are relevant to instruction. Once the topic assignment and Writing Plan worksheet are developed by the science teacher, they are distributed to students, accompanied by the Informational/Expository Writing rubric outlining expectations (view both the worksheet and the rubric online at *www.nsta.org/middleschool/connections.aspx*). To ensure consistency, the student Writing Plan worksheet's process closely mimics what students experienced when writing in their ELA class. The Writing Plan guides students to

- *plan and develop* their ideas, employing a thinking map or outline (see Figure 3 and Resources),
- *draft* a well-developed paragraph, and
- *revise and edit* their written work with a specific worksheet checklist to guide them through this part of the process (view the checklist with the online version of this article).

Whereas shorter written pieces (paragraphs) take two to three days of in-class planning, drafting, editing, and revising, longer expository-writing pieces, such as essays, arguments, or research papers, may absorb one to two weeks of in-class time when student research or an investigation is required.

To track and document writing progress, we collect and assess student writing samples each quarter using uMS team–developed common writing rubrics. Our standards-based report card documents individual student progress toward mastery of the selected *CCSS* reading and writing standards within the content areas. The standards-based report card is based on grade-level state and national standards that are assessed during the academic year. Each assessed standard appears on the student report card. In science, one will find a combination of both *NGSS* and *CCSS* standards on the report card. Some science standards may be assessed for a limited time (*NGSS*), depending on the unit of study, whereas *CCSS* reading and writing standards may be assessed throughout the year.

Creating a framework for expository-writing assignments

To begin the *CCSS* writing-integration process in our school, the ELA, social studies, and science teachers collaborated to determine which *CCSS* writing stan-

dards for informational text would effectively assess expository writing in science and social studies classes during the academic year. Each *CCSS* writing standard was evaluated for value and pertinence to expository writing and inclusion in our standards-based report card (see sidebar below for a sample of *Common Core* standards we selected).

Once the *CCSS* writing standards for assessment were agreed upon by the uMS team, discussion turned to the student writing process and expectations. Our ELA teacher explained to content teachers the writing process she teaches, which includes student requirements and expectations that lead to successful evidence for writing-standard mastery. The discussion also produced a list of documents students would submit with each final draft of expository writing to document evidence of the writing process, which we referred to as the Student Writing Portfolio (Figure 4).

Next, our team determined the type of expository-writing assignment that would be assessed each quarter. All uMS teachers agreed that the first-quarter writing assignment would focus on an expository paragraph in preparation for an expository essay to be assessed during the second quarter. Together, we decided that third- and fourth-quarter science/social studies expository writing would focus on research and argument, limited to either science class or social studies class, so as not to burden students or teachers. The expository writing topic is dependent on the unit of study in the content area during that quarter, as determined by the content teachers. Fewer *CCSS* writing standards are assessed for expository paragraphs, whereas more complex writing standards are added to more complex writing, such as arguments or research projects.

Connecting to the *Common Core State Standards, ELA* (NGAC and CCSSO 2010)

Below are the most relevant standards addressed by the methods in our uMS science classes.

CCSS.ELA-LITERACY.WHST.6-8.2
Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.

CCSS.ELA-LITERACY.WHST.6-8.4
Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

CCSS.ELA-LITERACY.WHST.6-8.5
With some guidance and support from peers and adults, develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on how well purpose and audience have been addressed.

CCSS.ELA-LITERACY.WHST.6-8.8
Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation.

CCSS.ELA-LITERACY.L.7.1
Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.

CCSS.ELA-LITERACY.L.7.2
Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing.

CCSS.ELA-LITERACY.RST.6-8.7
Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).

CCSS.ELA-LITERACY.RST.6-8.1
Cite specific textual evidence to support analysis of science and technical texts.

CCSS.ELA-LITERACY.RST.6-8.2
Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.

CCSS.ELA-LITERACY.RST.6-8.3
Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.

CCSS.ELA-LITERACY.RST.6-8.4
Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6–8 texts and topics.

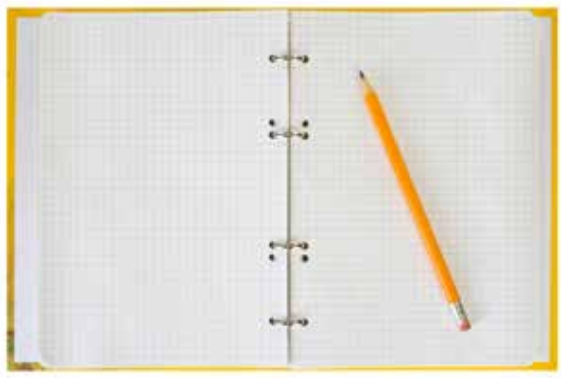
FIGURE 4 Student Writing Portfolio requirements

1. Expository Writing Rubric
2. Assignment and requirements (assigned standards listed on assignment sheet)
3. Prewriting: evidence, thinking map, or outline (student-generated or teacher-guided)
4. First draft, printed, with revisions made manually
5. Revision Reflection worksheet: three to five goals for revision after the first draft
6. Final draft

The next task was to collaboratively create a rubric that encompassed all parts of a well-developed expository-writing piece and all parts of the writing standard, as previously defined by the team. We began with the uMS expository-paragraph rubric and the writing standards associated with it. With guidance from the ELA teacher, all uMS teachers participated in developing the language for the rubric together (see the online expository-writing rubic for the standards we chose to incorporate). Once common rubrics for expository writing were developed, our ELA teacher began to work with the science and social studies teachers to develop formative expository-writing assessments in each subject, and then brainstorm ideas for summative expository assessments that align with content coverage. During this initial effort to teach expository writing within content areas, it is reasonable to expect the writing topics to reflect content covered during the academic year. These topics may vary from year to year, depending on the direction of the curriculum or the time of year content is covered.

Conclusion

Our uMS goal is to improve student expository writing overall in every written response, extended or brief, and in all subjects. Through instruction and well-established expository-writing practices within content areas, students have the opportunity to practice writing skills by planning, drafting, and revising expository writing. In addition to providing mastery of *CCSS* writing standards, expository writing is a vehicle to provide evidence of mastery in content as students provide evidence, construct explanations, and obtain, evaluate, and communicate information. Consistent



practice using writing skills in ELA and other content areas enables students to make the connection between writing well and providing well-written evidence of their understanding. ■

Acknowledgments

Ellen Dohan is the uMS ELA teacher at Alphonsus Academy & Center for the Arts and was instrumental during our collaboration to integrate expository writing into content areas. Ms. Dohan shared her expertise to support and coach informational text–reading strategies, writing-process guidelines, and expository-rubric development. Chris Petersen is the uMS social studies teacher at Alphonsus Academy & Center for the Arts. Mr. Petersen was also an active participant as a project co-collaborator, developing criteria and rubrics for expository and argumentative/persuasive writing.

References

National Governors Association Center for Best Practices and Council of Chief State School Officers (NGAC and CCSSO). 2010. *Common core state standards.* Washington, DC: NGAC and CCSSO.

NGSS Lead States. 2013. *Next Generation Science Standards: For states, by states.* Washington, DC: National Academies Press. *www.nextgenscience.org/next-generation-science-standards.*

Resources

CCSS Reading: Science and Technical Subjects—*www.corestandards.org/ELA-Literacy/RST/6-8*

Cornell notes—*http://coe.jmu.edu/learningtoolbox/cornellnotes.html*

Thinking Maps—*http://thinkingmaps.com*

Susan Merten (*smerten@alphonsusacademy.org*) is a middle school science teacher at Alphonsus Academy & Center for the Arts in Chicago, Illinois.