SIM
Strategic Instruction Model®

Content Enhancement Routines

SIM Content Enhancement Routines (CERs) are dynamic instructional tools that use powerful teaching devices and procedures to plan for and teach critical content in an understandable and easy-to-learn manner. Teachers engage students collaboratively to develop understanding in a way that maintains the integrity of the content while meeting both group and individual needs.

Components of CERs

CERs consist of three elements that help teachers focus on critical content, enhancement of that content, and a common instructional routine:

Content

Teachers use CERs to plan for and teach critical content to academically diverse classes in ways that all students can understand and remember key information, and develop reasoning skills. In essence, we advocate teaching a little less content but teaching it better, allowing a focus on the most critical content.

Enhancement

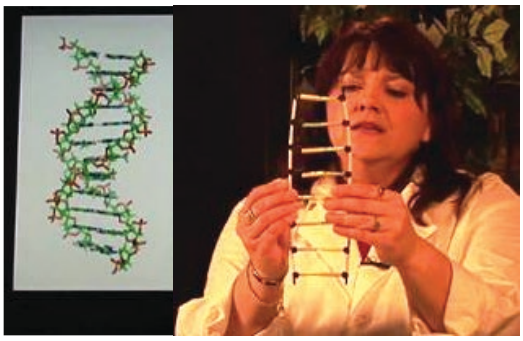
With CERs, teachers have access to visual devices or graphic organizers, and specially developed cognitive strategies, each tailored to enhance understanding of different content demands. Teachers actively engage students through interactive dialogue and collaborative co-construction of understanding; these interactions support problem-solving and critical thinking skills for all students.

Routine

Each CER is developed using common instructional procedures that incorporate both explicit instruction and collaborative development of learning:

- an advance organizer
- a collaborative process developing student understanding using the graphic device and strategic steps
- a post organizer

"SIM is the HOW to your WHAT and WHY."

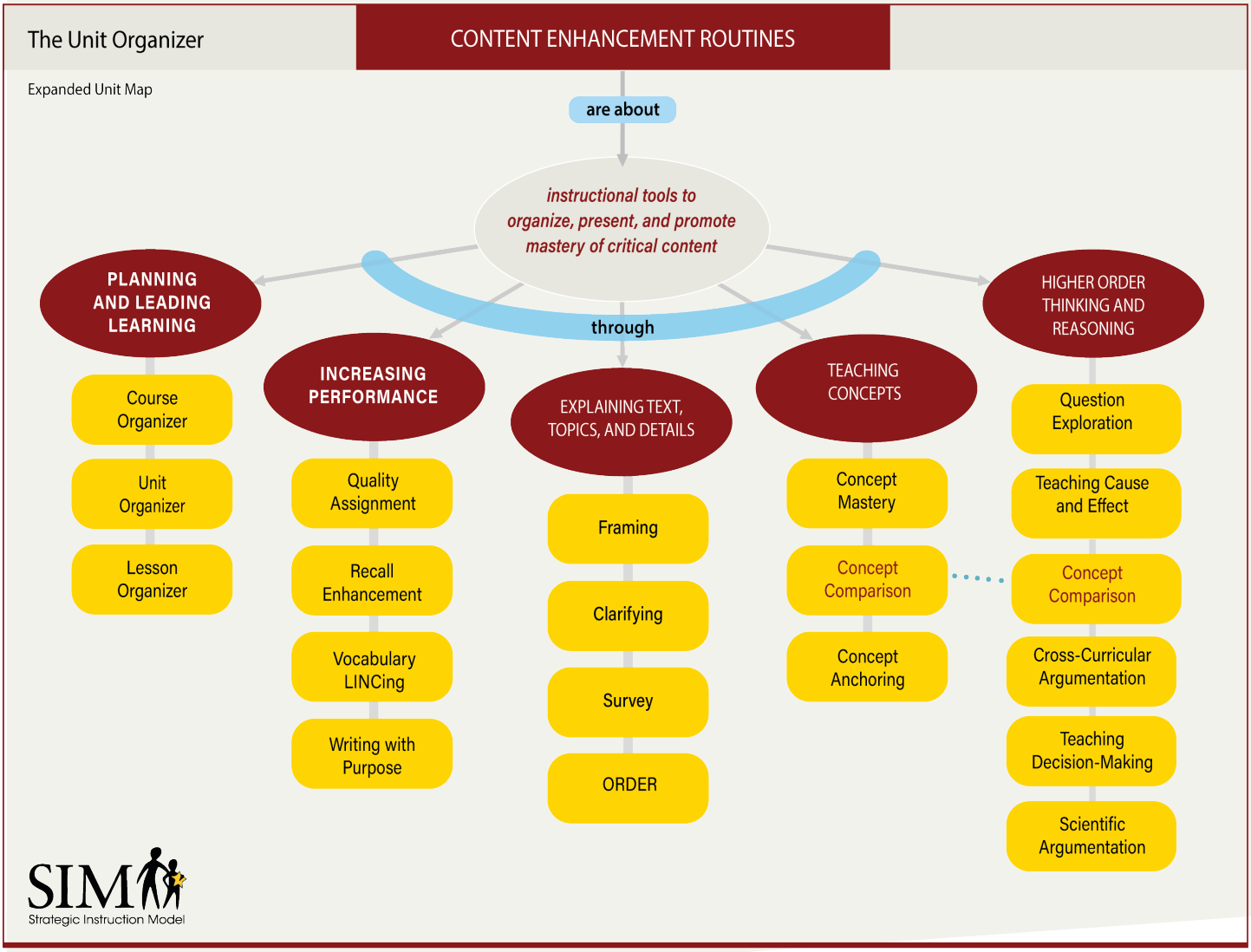


For in-depth descriptions of SIM instructional tools and interventions, please visit KUCRL's SIM website:

sim.ku.edu

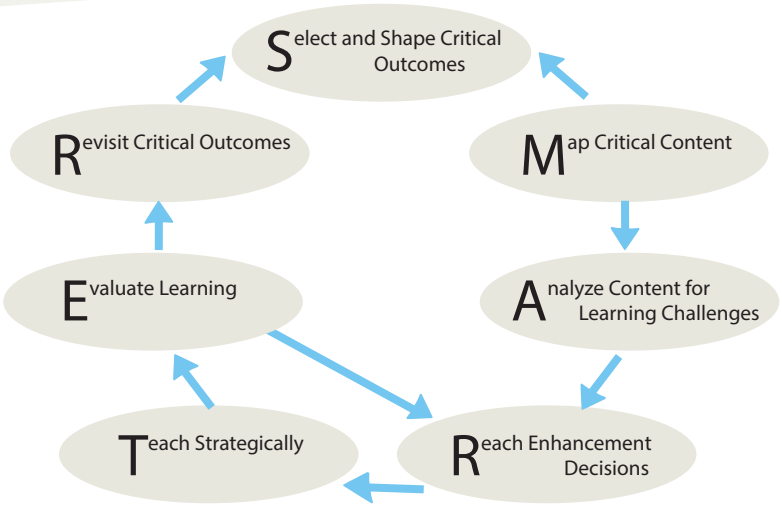
Overview of the Content Enhancement Routines

The sets of CERs are organized around five clusters of common teaching and learning goals as shown in the expanded map below (from the Unit Organizer Routine).



The SMARTER Instructional Cycle

The **SMARTER Instructional Cycle** guides the selection of CERs and supports teachers broadly in planning, teaching, and evaluating student learning of critical content.



Why Content Enhancement Routines?

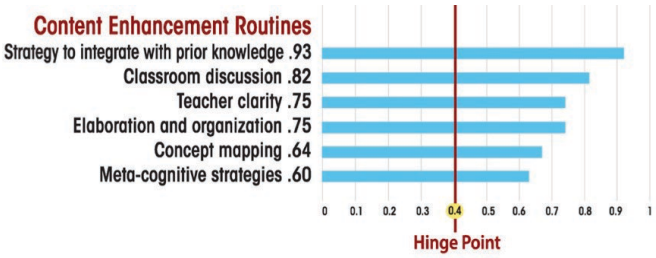
CERs are responsive to a range of student needs in content area classes. They were designed to provide instruction for all students, including those with learning challenges.

- **Explicit Instruction** is built into the instruction using advance and post organizers and guided learning. To do this, teachers inform students of the focus of the instruction, any learning supports that will be used, and expectations for student participation. Teachers remind students how to use visual devices (i.e., graphic organizers) and embedded strategies, and review the process and content of learning.

- Co-constructed **collaborative learning** is incorporated as understanding is developed by using the visual device and cognitive strategy. Students participate in conversations about critical questions, develop required background knowledge, analyze and answer questions, construct clear answers, and extend their knowledge in different ways. This collaborative learning may include inquiry learning and exploratory activities, including online learning as appropriate.

- Components of **universal design of learning** are used, including multiple means of representation, engagement, and comprehension. These include different ways of learning such as visual and verbal, clear statements and goals of learning, flexible options for all students, access to resources, and student participation in building and internalizing learning.

Hattie (2017) Effect Sizes* for Key Features of SIM Instructional Tools and Interventions



Effect size is a quantitative measure of the magnitude of influence an experimental effect has on student outcomes. According to John Hattie, practices with effect sizes of d>.40 have a greater than average influence on achievement.

Evidence-Based

KUCRL conducted research in public schools, primarily in middle and high school settings. CERs were successfully field-tested in general education classrooms characterized by significant academic diversity and, in some cases, special education classrooms. Across settings, studies included students with learning challenges, students with low, average, and high course grades, and students with identified learning disabilities. Research demonstrated that consistent use of each routine is a key ingredient for instructional success. The researchers developed the CER guidebooks to support teacher access to the instructional principles and procedures found effective during the studies. Additional research on specific student populations studied are described on our website.

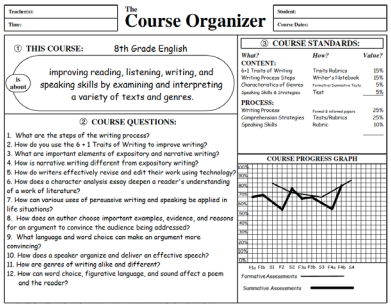
Contact us:

KU THE UNIVERSITY OF KANSAS
Center for Research on Learning

The Professional Development Research Institute
Haworth Hall, Room 3107
1200 Sunnyside Avenue
Lawrence, KS 66045
785.864.0626 • 785.864.5728 (fax)
simpd@ku.edu • http://sim.ku.edu

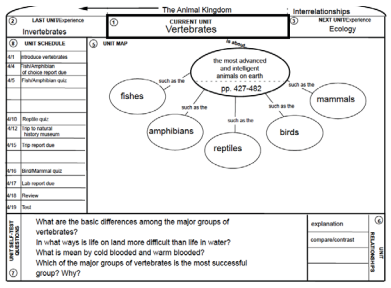
Routines for Planning & Leading Learning

These Content Enhancement Routines help teachers think about and organize content, then present it in such a way that students can see the organization.



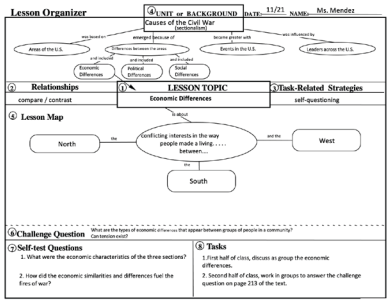
Teachers use the **Course Organizer Routine** to plan courses around essential learning and critical concepts. At the start of the year, teachers introduce the course and class rituals, and they revisit them throughout the year to help students maintain focus on the big ideas and understand important relationships.

Students whose teachers used the **Course Organizer Routine** correctly answered significantly more "big idea" questions--twice as many--than students in the comparison condition. Additionally, teachers who used this routine spent considerably more time introducing major course ideas, concepts, themes and routines, and using innovative instructional practices than teachers in the comparison condition in a study in middle and high school science and social studies classrooms.



Teachers use the **Unit Organizer Routine** to plan units, introduce and maintain the big ideas in units, and show how units, critical information, and concepts are related.

In studies with students in secondary social studies and science classes, students whose teachers used the **Unit Organizer Routine** regularly scored an average of 15% higher on unit tests than students whose teachers used the routine only irregularly or not at all.

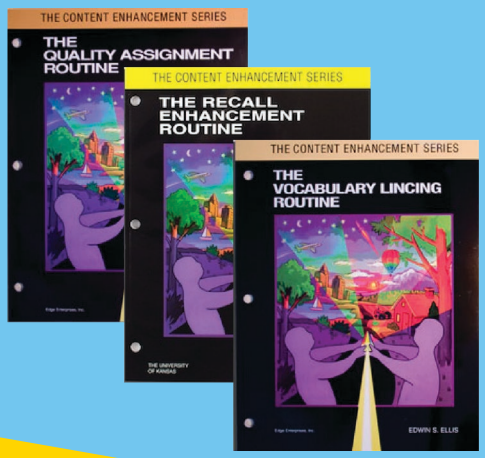


Teachers use the **Lesson Organizer Routine** to plan lessons and then introduce and connect ideas to the unit and the course.

In studies with students in English Language Arts, social studies, and science classrooms in grades 10-12, students whose teachers used the **Lesson Organizer Routine** scored an average of 15% higher on unit tests than students whose teachers used the routine only irregularly or not at all.

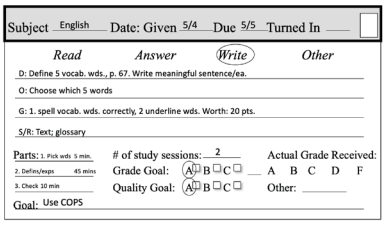
Professional Learning

KUCRL is committed to finding solutions to educational challenges and placing our research findings into the hands of practitioners, students, and researchers in the field. Our expansive network of dedicated professionals —the SIM International Professional Development Network — shares our values and goals for delivering high-quality professional learning with a partnership approach to educators around the world. These experts offer professional development, instructional coaching, and technical assistance to establish the necessary infrastructure support for educators to implement evidence-based practices.



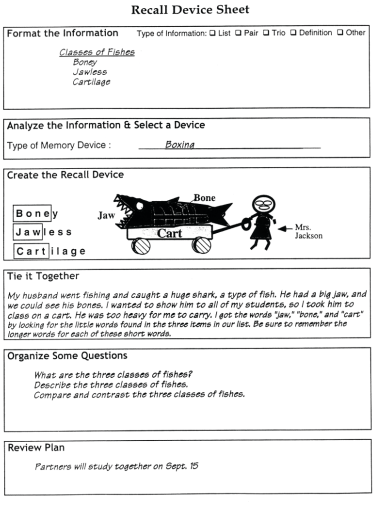
Routines for Increasing Performance

These Content Enhancement Routines help students complete work in the classroom.



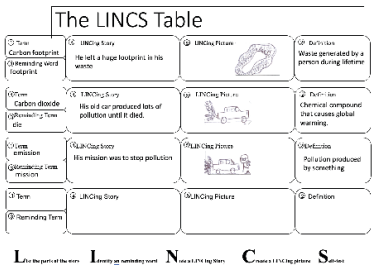
Teachers use the **Quality Assignment Routine** to plan, present, and engage students in quality assignments and then evaluate assignments with students.

Teachers who used the **Quality Assignment Routine** had significantly more planning behaviors, use of key presentation behaviors, and use of key evaluation procedures, all of which are research-identified characteristics of good assignments, than when they did not use this routine and than the comparison group. Both teachers and students were significantly more satisfied with assignments in a study with students in grades 6-8.



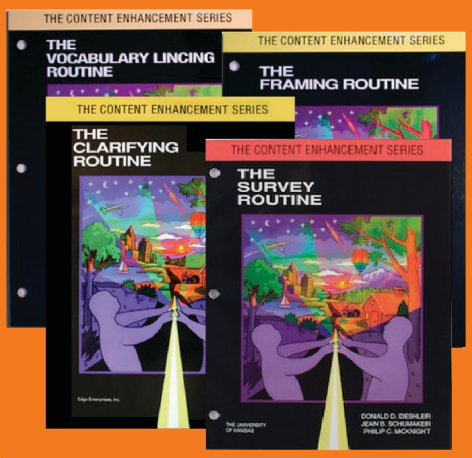
Teachers use the **Recall Enhancement Routine** to show students how to create and use a range of mnemonic devices to remember information and study for tests. These include visual memory devices, keyword devices, and association, acronyms and rhymes.

Students whose teachers used the **Recall Enhancement Routine** had significantly higher overall posttest scores compared to pretest scores than students in the comparison group. Students in the experimental group created appropriate devices needed to recall information for 42% of the test items whereas those in the control group the number was 24.7% in 7th grade life science classrooms.



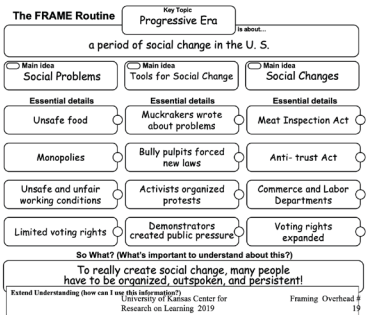
Teachers use the **Vocabulary LINCing Routine** to facilitate student use of two powerful tools (an auditory memory device and a visual memory device) to help them learn and remember the meaning of complex terms.

Among both students with and without LD, students whose teachers used the **Vocabulary LINCing Routine** had significantly higher overall vocabulary test scores than when their teacher had not used the routine. Students improved their performance by 19% in a study with students in grade 9.



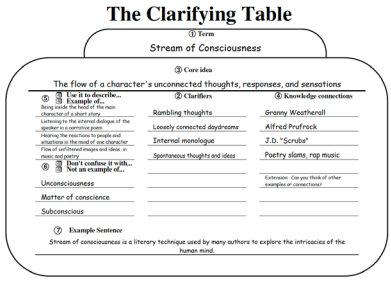
Routines for Explaining Text, Topics and Details

These Content Enhancement Routines help teachers and students explore text, topics, and details.



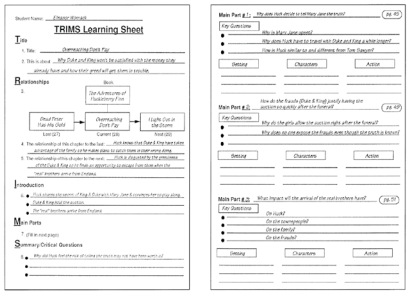
Teachers use the **Framing Routine** to transform abstract main ideas and key topics into a concrete representation that helps students think about and talk about the key topic and essential related information.

Average-achieving students, high-achieving students, and students with LD whose teachers used the **Framing Routine** had significantly higher overall scores on oral and written tests than students in the comparison condition across two studies conducted in ELA and social studies secondary classes. Students with LD in the experimental group wrote an average of 102 more words in their post-test product than students with LD in the comparison group, which was also more words than average achieving students in the comparison group.



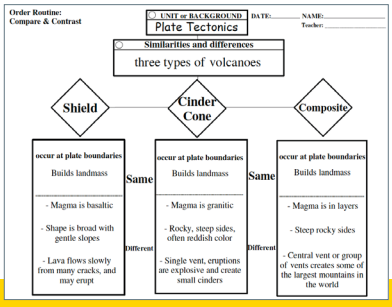
Teachers use the **Clarifying Routine** to focus on a topic and then explore related details and the topic's connection to critical concepts and ideas. This routine helps students master the meaning of targeted words and phrases.

All students, including English language learners and those with LD, whose teachers used the **Clarifying Routine** had significantly higher overall test scores than when the routine was not used. In studies with students in grades 4-6, students with high socioeconomic level improved by 14%; students with middle socioeconomic level improved by 30%, and students with low socioeconomic level improved by 20%.



Teachers use the **Survey Routine** to construct an overview of a reading assignment when students are having difficulty reading and sorting out information from inconsiderate text.

Students whose teachers taught them how to use the **Survey Routine** had significantly higher overall test scores than when it was not used. All students answered an average of 10% to 15% more test questions correctly in studies with students with LD and those with low, average, and high course grades in grades 7-12.

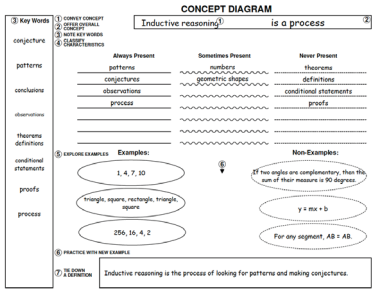


Teachers use the **ORDER Routine** to organize and make sense of information visually. Students think about what they have just learned or read, try to understand how it all fits together, look for any missing information or errors in their notes, and try to fit it all together to create their own graphic organizer.

Students with and without LD in grades 7 to 12 whose teachers taught them how to use the **ORDER Routine** had significantly higher test scores on recognizing the expository relationships among content in a reading passage and in creating appropriate graphic organizers for the content compared to when the routine was not used.

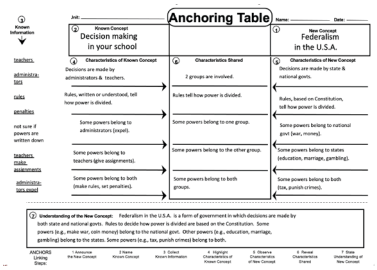
Routines for Teaching Concepts

These Content Enhancement Routines help teachers present complex concepts, so students gain a deep understanding and develop a shared vocabulary for talking about important information.



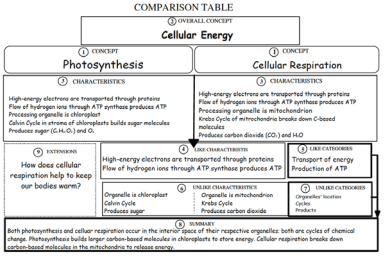
Teachers use the **Concept Mastery Routine** to identify characteristics of an example of a concept class that must be always, sometimes, and never present to fit in the concept class. New examples are explored to confirm understanding of a concept.

Among both students with and without LD, students whose teachers used the **Concept Mastery Routine** had significantly higher overall test scores after concept teaching and review on concept acquisition and regularly scheduled tests than during baseline. For regular classroom tests in grades 7-12, 97% of students without LD and 75% of students with LD scored at or above the common passing grade level.



Teachers use the **Concept Anchoring Routine** to introduce and anchor a new concept to a concept that is already familiar to students, that is, to learn by analogy.

Students whose teachers used the **Concept Anchoring Routine** had significantly higher overall test scores than students in the comparison condition. In the experimental condition, students with LD scored 25% higher, low-achieving students scored 27% higher, average-achieving students scored 19% higher, and high-achieving students scored 7% higher than these groups in the comparison condition in studies in secondary science and social studies classes.

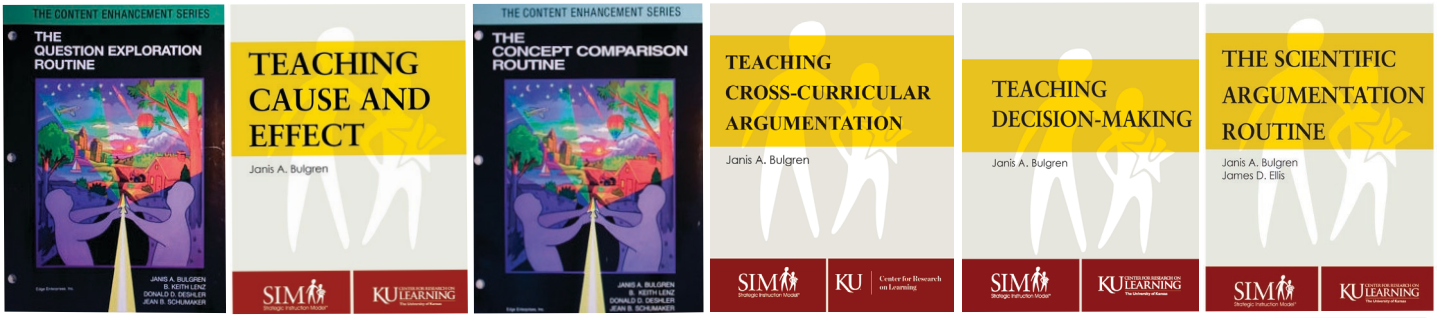


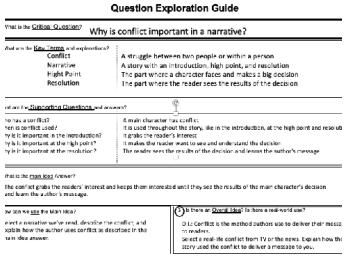
Teachers use the **Concept Comparison Routine** to help students compare and contrast key concepts by exploring characteristics of each concept and then distinguishing between the concepts that were similar and those that were different.

Students whose teachers used the **Concept Comparison Routine** had significantly higher overall test scores than students in the comparison condition. Students with LD in the experimental condition scored 14.64% higher and low-achieving students scored 23.72% higher than those in the comparison condition in studies with students in grades 7-12.

Routines for Higher Order Thinking and Reasoning

These Content Enhancement Routines help students engage in critical skills required by state standards.




Question Exploration Guide

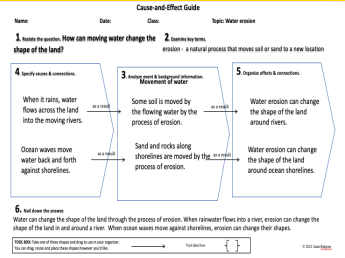
What is the Critical Question?
Why is conflict important in a narrative?

And some Key Terms and explanations?

Conflict	A struggle between two people or within a person
Narrative	A story with an introduction, high point, and resolution
Right Point	The part where a character faces and makes a big decision
Resolution	The part where the reader sees the results of the decision

Teachers use the **Question Exploration Routine** to help students understand a "critical question" and to arrive at a main idea answer. Students learn to break apart a large question into smaller, more manageable questions, answer those questions, arrive at the main idea answer, apply the main idea to the subject area or related issue and generalize the idea.

Students whose teachers used the **Question Exploration Routine** had significantly higher overall test scores than students in the comparison condition across three studies conducted in ELA secondary classes, 7th grade science and social studies classes, and in secondary urban schools, grades 9-12. For ability to write essays, students in the experimental group improved their scores, with moderately large to very large effect sizes; those in the comparison group scored lower on the posttest than the pretest.


Cause-and-Effect Guide

Name: Date: Class: Topic: Water erosion

1. Restate the question. How can moving water change the shape of the land?

2. Examine key terms. erosion - a natural process that moves soil or sand to a new location

4. Specify causes & connections.
When it rains, water flows across the land into the moving rivers. as a result
Ocean waves move water back and forth against shorelines. as a result

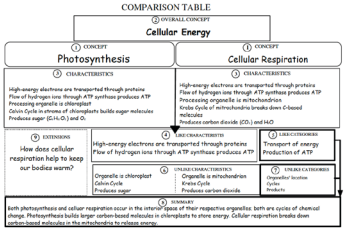
3. Analyze event & background information. Movement of water
Some soil is moved by the flowing water by the process of erosion. as a result
Sand and rocks along shorelines are moved by the process of erosion. as a result

5. Organize effects & connections.
Water erosion can change the shape of the land around rivers.
Water erosion can change the shape of the land around ocean shorelines.

6. Nail down the answer.
Water can change the shape of the land through the process of erosion. When rainwater flows into a river, erosion can change the shape of the land in and around a river. When ocean waves move against shorelines, erosion can change their shapes.

Teachers use the **Cause-and-Effect Routine** to help students engage in higher-order reasoning and to think critically about an event, action, idea, topic or procedure, important key terms necessary for understanding causes and effects, and to summarize understanding.

Students whose teachers used the **Cause-and-Effect Routine** had significantly higher test scores on knowledge of the cognitive strategy steps, use of the strategic procedures, and note-taking than students in the comparison condition. Significant correlations were found between both student knowledge of the strategy and note-taking, and their ability to apply cause-and-effect reasoning in a study in 7th and 8th grade science and social studies classrooms.


COMPARISON TABLE

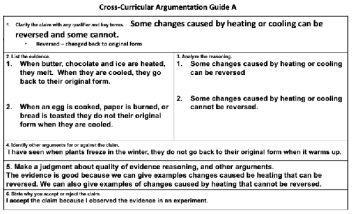
OVERALL CONCEPT: Cellular Energy

CONCEPT: Photosynthesis	CONCEPT: Cellular Respiration
CHARACTERISTICS: High-energy electrons are transported through proteins; Flow of hydrogen ions through ATP synthase produces ATP; Processing organelle is chloroplast; Calvin Cycle is stroma of chloroplasts builds sugar molecules; Produces sugar ($C_6H_{12}O_6$) and O_2	CHARACTERISTICS: High-energy electrons are transported through proteins; Flow of hydrogen ions through ATP synthase produces ATP; Processing organelle is mitochondrion; Krebs Cycle of mitochondria breaks down 6-based molecules; Produces carbon dioxide (CO_2) and H_2O
EXTENSIONS: How does cellular respiration help to keep our bodies warm?	SUBCATEGORIES: Transport of energy; Production of ATP
SUBCHARACTERISTICS: High-energy electrons are transported through proteins; Flow of hydrogen ions through ATP synthase produces ATP	
UNIQUE CHARACTERISTICS: Organelle is chloroplast; Calvin Cycle; Produces sugar	UNIQUE CHARACTERISTICS: Organelle is mitochondrion; Krebs Cycle; Produces carbon dioxide
ENERGY CATEGORIES: Organelle location; Reactants; Products	

SUMMARY: Both photosynthesis and cellular respiration occur in the interior space of their respective organelles; both are cycles of chemical change. Photosynthesis builds larger carbon-based molecules in chloroplasts to store energy. Cellular respiration breaks down carbon-based molecules in the mitochondria to release energy.

Teachers use the **Concept Comparison Routine** to enhance students' understanding of the similarities and differences between concepts by identifying critical characteristics of each concept, identifying the larger categories to which each belongs, then summarizing, generalizing, and extending understanding.

Students whose teachers used the Concept Comparison Routine had significantly higher overall test scores than students in the comparison condition with medium to large effect sizes. Students with LD in the experimental condition scored 14.64% higher and the low-achieving students scored 23.72% higher than those in the comparison condition in studies with students in grades 7-12.


Cross-Curricular Argumentation Guide A

Some changes caused by heating or cooling can be reversed and some cannot.
- Reversed – changed back to original form

2. List the evidence.	3. Analyze the reasoning.
1. When butter, chocolate and ice are heated, they melt. When they are cooled, they go back to their original form.	1. Some changes caused by heating or cooling can be reversed
2. When an egg is cooked, paper is burned, or bread is toasted they do not their original form when they are cooled.	2. Some changes caused by heating or cooling cannot be reversed.

4. Identify other arguments for or against the claim.
I have seen when plants freeze in the winter, they do not go back to their original form when it warms up.

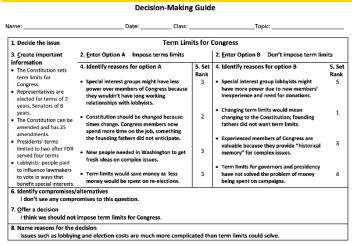
5. Make a judgment about quality of evidence reasoning, and other arguments.
The evidence is good because we can give examples changes caused be heating that can be reversed. We can also give examples of changes caused by heating that cannot be reversed.

6. State why you accept or reject the claim.
I accept the claim because I observed the evidence in an experiment.

Teachers use the **Cross-Curricular Argumentation Routine** to guide students to evaluate whether a claim is supported by evidence and reasoning, consider counterarguments, and make a decision to accept or reject the claim.

Teachers use the **Scientific Argumentation Routine** to help students think critically about a science claim, decide on the strength of the evidence, and explain the reasoning to accept or reject the claim.

The use of argumentation is supported by two routines –the **Scientific Argumentation Routine** (SAR) and the **Cross Curricular Argumentation Routine** (CCAR). Students whose teachers used the SAR had significantly higher overall test scores than students in the comparison condition with large effect sizes. Differences between mean pretest and posttest scores were 50% larger in the 7th grade experimental group, and almost twice as large for the 8th and 9th grade students compared to students in the comparison condition. Research data from the SAR provided support for the development of the CCAR; research is ongoing across different content areas.


Decision-Making Guide

Name: Date: Class: Topic:

1. Decide the issue: Term Limits for Congress

3. Create important information	2. Enter Option A Impose terms limits	S. Set Rank	2. Enter Option B Don't impose term limits	S. Set Rank
• The Constitution sets term limits for Congress. • Representatives are elected for terms of 2 years, Senators of 6 years. • The Constitution can be amended and has 25 amendments. • Presidents' terms limited to two after FDR served four terms. • Lobbyists: people paid to influence lawmakers to vote in ways that benefit special interests.	4. Identify reasons for option A • Special interest groups might have less power over members of Congress because they wouldn't have long working relationships with lobbyists. • Constitution should be changed because times change, Congress members now spend more time on the job, something the founding fathers did not anticipate. • New people needed in Washington to get fresh ideas on complex issues. • Term limits would save money as less money would be spent on re-elections.	3 2 3 3	4. Identify reasons for option B • Special interest group lobbyists might have more power due to new members' inexperience and need for donations. • Changing term limits would mean changing to the Constitution; founding fathers did not want term limits. • Experienced members of Congress are valuable because they provide "historical memory" for complex issues. • Term limits for governors and presidency have not solved the problem of money being spent on campaigns.	5 1 3 4

6. Identify compromises/alternatives
I don't see any compromises to this question.

7. Offer a decision
I think we should not impose term limits for Congress.

8. Name reasons for the decision
Issues such as lobbying and election costs are much more complicated than term limits could solve.

Teachers use the **Decision-Making Routine** to engage students in reasoning about an issue, options or responses, required knowledge, reasons to support each option, and to evaluate, judge, and rank options, propose alternatives, and make and explain their decision.

Students whose teachers used the **Decision-Making Routine** had significantly higher overall posttest scores than pretest scores --almost twice as large as scores in the comparison group. Data also suggested that students in 7th and 8th grade science and social studies experimental classes could transfer use of the strategy to a different content area in which the teacher had not used the routine in that classroom.