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Content Enhancement
The power of integration

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With the publication of the *ORDER Routine* in Summer 2004, KU-CRL now has a total of 14 guidebooks in its Content Enhancement Series. Because each of these routines meets a different need, teachers often ask, "How do we know when to use which routine? How do we know which one is going to be the most powerful?"

The answer, in many cases, requires teachers to look beyond a single routine and consider a bigger question: How can we integrate several Content Enhancement Routines in a seamless instructional package that meets the needs of all students in a class?

This article describes how the power and effectiveness of Content Enhancement Routines can be increased by combining several routines into a comprehensive package. Topics include the cyclical nature of selecting and developing devices and routines, incorporating state and national standards into this process, and leveraging Content Enhancement Routines to coordinate instruction across grade levels through school-wide collaboration.

Content Enhancement Routines are directed at how teachers think about, adapt, and interactively explore their critical content with students in "learner-friendly" fashion. They are sets of inclusive teaching practices that help teachers carefully organize and present critical information in such a way that students identify, organize, comprehend, and recall it.

You can think of the Content Enhancement Series and a construction worker's toolbox as similar. For any building project, the construction worker is likely to need a variety of tools—a hammer, a screwdriver, a measuring tape, a saw, and a wrench—to complete the project. The worker will need different tools in different situations: a hammer to drive a nail, a saw to trim a board. Using the right tool for the right job produces a higher quality product than trying to make a wrench work for all construction needs.

The same is true for using Content Enhancement Routines to organize and teach content to students. Therefore, teachers need to pick the right tool for each job, build understanding by using a variety of tools, meet specifications set by standards, and build solid foundations using Content Enhancement Routines across grade levels.

Picking the right tool for each job

Selecting the right routine can be challenging. As author or co-author of half of CRL's Content Enhancement guidebooks, most recently the *Question Exploration Guide,* Jan Bulgren advises teachers to consider the needs of *all* their students as they plan their instruction and select routines.

"As we plan, we need to be thinking not

only of active, engaged students, but also that student who may sit quietly in the back of the classroom," Jan says. "The teacher may have difficulty determining what experiences and background knowledge that student brings to the course. How can a teacher ensure that all students have approximately the same information to work with as the lesson starts and construction of knowledge begins? Everything has to be in place for optimal new learning to occur. This may require the use of Content Enhancement Routines that specifically help the teacher explore students' prior knowledge, expand vocabulary, and set a class climate in which all students feel comfortable participating."

For many teachers, this means expanding their comfort zone from using only one or two favorite Content Enhancement Routines to include an array of routines. Having access to a great variety of Content Enhancement tools is necessary because the process of developing one device often suggests other devices that can supplement and expand on the information.

Building student understanding

Jan describes the process of developing a package of Content Enhancement Routines as organic and cyclical. For example, the information contained in a Unit Organizer may suggest the need to develop a Concept Diagram or a Question Exploration Guide; the process of developing the information on that device may, in turn, suggest refinements to the Unit Organizer.

In recent years, Jan has collaborated with science educators at the high school and university levels to develop Content Enhancement devices for use in high school biology classrooms, new territory for the former English teacher. The process she and her colleagues followed is a model for others

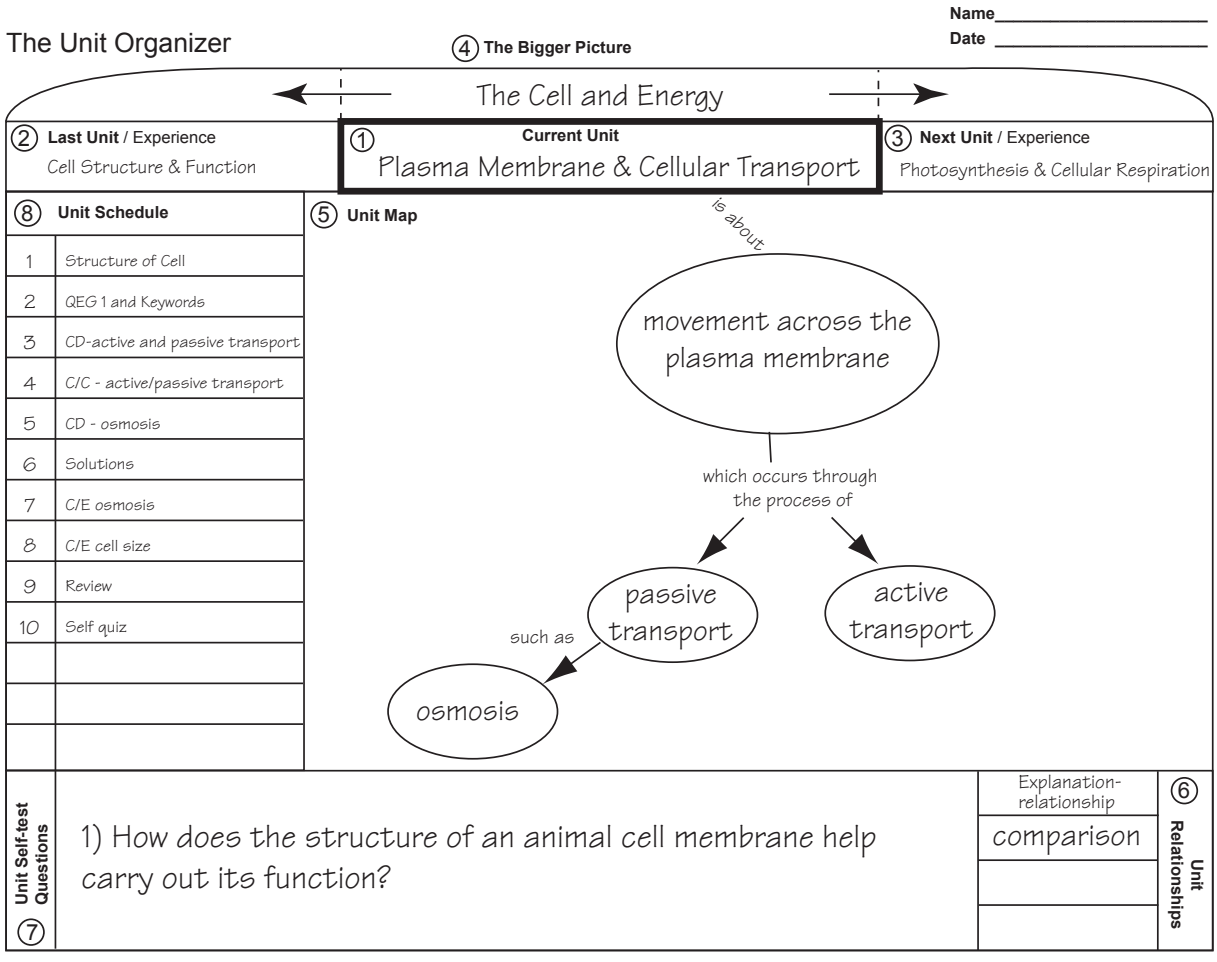

Figure 1: Unit Organizer

seeking to develop an effective Content Enhancement package and illustrates the organic nature of selecting and refining the right Content Enhancement tools.

Using a Unit Organizer depicting a planned unit on cellular transport (Figure 1 on page 2) as an example, Jan describes the interplay among Content Enhancement Routines.

"The very act of putting together a Unit Organizer should suggest other enhancements that may be needed," Jan says. "For example, when I see the Unit Organizer on passive and active transport, it may make me realize that I should also develop a Concept Comparison Table that further explains the similarities and differences in passive and active transport. Then, when I use the word 'osmosis,' I am prompted to wonder if *all* students really understand osmosis, or if I need to develop a Concept Diagram of 'osmosis.'

"Most importantly, I am prompted to review the critical questions on the Unit Organizer and make sure the questions focus on the three or four most important points in the unit. For each of these, I will develop a Question Exploration Guide.

"A major contribution of an Exploration Guide is its function as a double-check on what questions are worthy to ask: What answers do you want students to understand in depth and retain for use throughout the course? In most cases, the first question written on a Unit Organizer is not the one the teacher decides on after this planning process. At the end of the process, it is often better and more focused."

The process of thinking through the unit and developing the Unit Organizer device now has suggested at least three more routines that may help students master this content: Concept Comparison for a discussion of active and passive transport; Concept Mastery to examine osmosis; and Question Exploration to expand on the unit's critical questions. Figure 1 on page 2, Figure 2 on page 4, Figure 3 on page 5, and Figure 4 on page 6 illustrate how these devices can complement each other.

Jan notes that the process of developing these devices does not follow a strict sequence: Teachers don't always start with a Course Organizer and move, in some preordained order, through Unit Organizer, Lesson Organizer, Question Exploration, Concept Mastery, Concept Comparison, Concept Anchoring, and so on. The results of developing each device should prompt constant re-evaluation of other devices. A Question Exploration Guide, for example, may cause a teacher to reconsider her unit question. A completed Concept Comparison Table may suggest further modifications to a Concept Diagram.

"It all works together in an organic, recursive manner," Jan says. "If we revisit, rethink, and refine our Content Enhancements many times over within a whole course, the power of the integrated package of Content Enhancement becomes evident."

Although much of the discussion of Content Enhancement so far has focused on planning routines—Course, Unit, and Lesson—or on routines for understanding concepts, the Content Enhancement Series also includes a number of routines designed to meet specific instructional needs: There are routines for recalling or clarifying information; explaining text, topic, and details; and, as in the *ORDER Routine,* sketching text structure to assure understanding. See page 7 for brief descriptions of each.

Building according to specifications

Today, schools feel the pressure of state and national mandates related to student performance. The federal No Child Left Behind Act calling for research-based instructional methods and improved student performance can seem overwhelming in the face of classroom realities. Effective use of Content Enhancement Routines, all of which have been validated by research, can relieve some of these pressures.

Jan strongly advocates that teachers develop a clear understanding of district, state, and national standards in their content areas and keep their focus on these standards as they choose the routines and develop devices to use in their classes. Cross-checking national standards and state standards allows for a more comprehensive and coordinated approach to instruction. Likewise, teachers' consideration of assessments and multiple textbooks will help them identify the devices that will help students succeed.

"We need to keep going back to those district, state, and national standards because within those, we are going to find embedded learning and thinking challenges

Comparison Table

Name: Lydia Rhys
Unit:

② Overall Concept: methods of cellular transport

Date: 2-15-05
Lesson/Topic: Comparison of methods of transport

① Concept: passive transport

③ Characteristics
- moves substances and particles across plasma membrane
- sometimes uses transport proteins (facilitated diffusion)
- moves substances and particles from region of higher concentration to region of lower concentration (with the concentration gradient)
- does NOT require energy from the cell

① Concept: active transport

③ Characteristics
- moves substances and particles across plasma membrane
- always uses transport proteins
- moves substances and particles from region of lower concentration to region of higher concentration (against the concentration gradient)
- does require energy from the cell

⑨ Extensions
Explain how, in active transport, carrier proteins (a type of transport protein) help transport particles across the membrane.

④ Like Characteristics: moves substances and particles across plasma membrane

⑤ Like Category: purpose

⑥ Unlike Characteristics

sometimes uses transport proteins (facilitated diffusion)	always use transport proteins
moves substances and particles from region of higher concentration to region of lower concentration (with the concentration gradient)	moves substances and particles from region of lower concentration to region of higher concentration (against the concentration gradient)
does NOT require energy from the cell	does require energy from the cell

⑦ Unlike Category
- use of transport proteins
- involvement with concentration gradient
- energy requirements

⑧ Summary
Both passive and active transport are methods of cellular transport that have the purpose of moving substances and particles across the plasma membrane. They differ in their use of transport proteins, their involvement with the concentration gradient, and their energy requirements.
(Passive transport uses transport proteins only during facilitated diffusion and, because movement is with the concentration gradient, does not require energy. On the other hand, active transport always uses transport proteins and, because movement across the membrane is against the concentration gradient, does require energy from the cell.)

Figure 2: Comparison Table

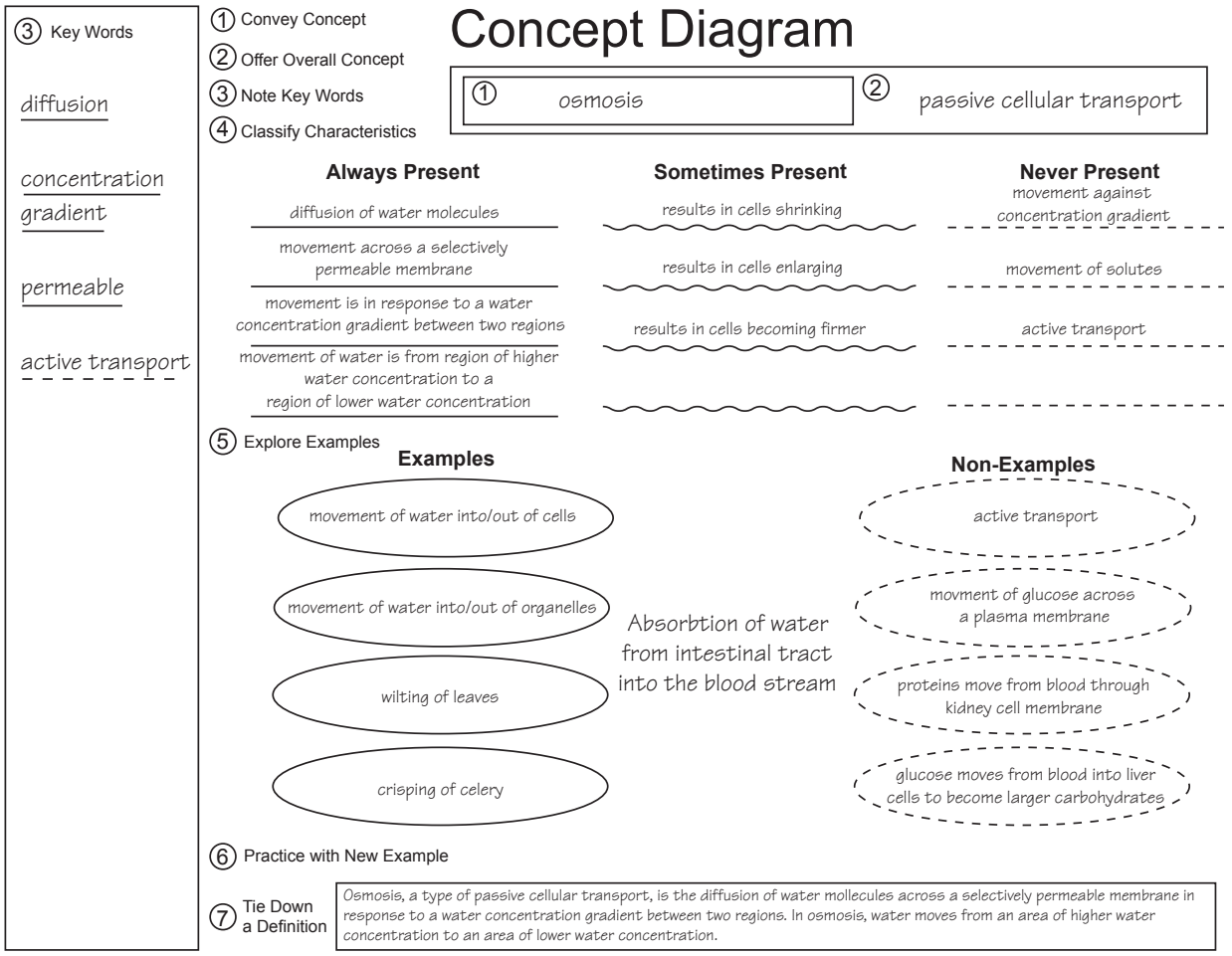

Figure 3: Concept Diagram

that are present in all content areas—Can students do inquiry? Can they identify causes and effects? Can they get together in groups and problem solve? Can they come to a decision? Can they explain that decision to others? Can they develop an argument to persuade others to their position?" Jan says. "Content Enhancement devices are often well-matched to demands found in standards. For example, standards often ask students to compare two concepts or explain a concept in detail, which are what Concept Comparison and Concept Mastery were designed to encourage."

Building from a firm foundation

With increasing frequency, educators are asking how they can ensure that the second-grade teacher, for example, is teaching the content that will lay the foundation for students' success in future science classes. Teams of teachers can work together to identify the critical background knowledge that students need to acquire at each grade level. This is often thought of as vertical planning.

Just as a classroom teacher can leverage the power of Content Enhancement for an entire course, teams of teachers can use the devices to plan and deliver critical content across grade levels. Working together, multi-grade teams identify the concepts and knowledge that students must master at each grade level to be successful at the next.

"Such collaboration among teachers at different grade levels is the ideal realization of whole-school change and school-wide adoption of Content Enhancement. It would allow reinforcement not only of *content knowledge* but also of the *thinking processes* embedded in the Content Enhancement Routines," Jan says.

Question Exploration Guide

Title/standard: Plasma Membrane and Cellular Transport
Student Name: Lydia Rhys Date: 2-15-05
Course Question #: _____ Unit Question #: 1 Lesson Question #: _____

(1) What is the Critical Question?

How does the structure of an animal plasma membrane help carry out its function?

(2) What are the Key Terms and Explanations?

plasma membrane	thin flexible barrier around a cell
structure	the way parts are put together to form a whole
function	actions for which a thing is suited
permeability	a feature that allows substances to pass through something else

(3) What are the Supporting Questions and answers?

What is the structure of an animal plamsa membrane?	An animal plasma membrane consists of a phospholipid bilayer with important substances interspersed throughout.
What is the function of the plasma membrane?	Its function is to identify and select, facilitate, and move substances across it.
What functions do the interspersed substances have?	a) Carbohydrates identify and select what should go in and out. b) Cholesterol facilitates the action of movement through the bilayer. c) Proteins move or transport certain materials across the cell membrane.

(4) What is the Main Idea answer?

The plasma membrane has a structure that lets it identify and select, facilitate and move substances in and out of the cell.

(5) How can we use the Main idea?

How would elimination of all cholesterol from the diet impact the function of the plasma membrane?
What is the importance of permeability in the functioning of a plasma membrane?

(6) Is there an Overall Idea? Is there a real-world use?

How does the consumption of trans-fats interfere with the function of the plasma membrane?

Figure 4: Question Exploration Guide

Conclusion

CRL's 14 Content Enhancement Routines offer an array of tools that promote direct, explicit instruction, the type of instruction that helps students who are struggling and that also facilitates problem-solving and critical thinking skills for all students. All are backed by research studies confirming their effectiveness, a top concern for schools seeking to ensure their teachers use scientifically based instructional practices. Integrating these routines packs the power to transform the learning experience for students of all abilities.

The Content Enhancement Series

Tools to master key concepts

Jerri Neduchal is a SIM Professional Developer who has worked with the Strategic Instruction Model since its inception more than 25 years ago.

"In every classroom I've been in, teachers need something right away to teach those abstract concepts that students typically just do not get," says Jerri, who has worked with teachers in more than a thousand classrooms.

Mastering concepts not only can be the difference between a student's passing and failing a particular course, but also between a school's meeting or not meeting state and national expectations, such as adequate yearly progress and the mandates of No Child Left Behind.

Jerri recommends starting professional development activities with the Concept Diagram, but adding several more devices and routines to lay the foundation for a complete, integrated set. Even teachers who may be proficient with a couple of Content Enhancement Routines may not have all the tools they need to help students understand concepts.

"If all we have in our repertoire is planning routines—Course, Unit, and Lesson—then we're missing the bigger piece, which would be each and every one of the teaching routines that get down to a focal concept that kids have to know," Jerri says.

Routines for planning and leading learning

The ***Course Organizer*** provides an overall framework for learning and sets expectations for the course.

The ***Unit Organizer*** shows how units within the course and critical pieces of information are related.

The ***Lesson Organizer*** involves the same kind of planning at the lesson level.

Routines for explaining text, topics, and details

The ***Clarifying Routine*** focuses on a topic and explores details of the topic, making connections to important ideas and concepts.

The ***Framing Routine*** develops literacy and thinking skills by transforming abstract ideas into concrete information students can more easily grasp and discuss.

The ***Survey Routine*** helps students who are having difficulty reading complex text by guiding them in creating an overview of the text.

Routines for teaching concepts

The ***Concept Anchoring Routine*** helps students understand a new concept by likening it to something they already understand.

The ***Concept Comparison Routine*** guides students in comparing and contrasting characteristics of two or more concepts.

The ***Concept Mastery Routine*** helps students understand key information and where it fits within a larger body of knowledge.

Routines for increasing performance

The ***Quality Assignment Routine*** helps teachers plan, present, and engage students in meaningful assignments.

The ***Question Exploration Routine*** helps groups of students understand significant course content by exploring a "critical question."

The ***Recall Enhancement Routine*** focuses on methods to boost students' ability to remember information.

The ***Vocabulary LINCing Routine*** helps students use two powerful memory devices to remember the meaning of complex terms.

The ***ORDER Routine*** aligns higher-order skills with systematic procedures. To check and summarize content learning, including discrete facts and comprehension, students are guided in identifying key lesson content and its expository relationships and in graphically representing what they know.

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