

Changing the Way the Brain Works Through Teaching
Linda Dorn, PhD.
California Reading Association

This handout consolidates key slides from the PowerPoint presentation.

The presentation is designed to cover four goals:

1. Present complex theory (how the brain responds to teaching) under 3 big ideas
2. Use video examples from multiple settings (grades K-8) to illustrate how the big ideas look in various school settings
3. Share concrete tools for applying big ideas to teaching and learning
4. Apply the big ideas to the Common Core State Standards.

THREE BIG IDEAS:

Big Idea #1

Teaching is based on what the student already knows, what the student needs to know, and what the student is capable of learning with assistance. Teaching changes as learning changes, thus keeping students' learning at the cutting edge.

Big Idea #2

Teachers design learning conditions that are based on how children acquire and construct knowledge within meaningful settings. We don't need a laundry list of things to, rather we need to know our students, our content, our books, and scaffolding techniques.

Big Idea #3

All learning is rhythmic with a balance of work (challenge) and ease (independence). This rhythm sustains the mind in almost fatigueless activity. Teacher scaffolding is increased to ensure students are successful at solving problems on harder tasks.

Our brain is biologically structured to learn from the environment. There is general agreement from neuroscience that the brain is shaped by 20% nature (biology) and 80% experience (environment). Therefore, the goal of teaching is to arrange the learning conditions, select the appropriate literacy tools, and provide adjustable scaffolds to ensure the student learns from school experiences.

Dorn's concept of 'learning as a constructive process' is based on a synthesis of four major theories: David Kolb's theory of experiential learning, James Zull's application of Kolb's theory to his teaching of medical students, Marie Clay's theory of change over time in literacy processing, and Don Holdaway's theory of processing rhythms. This model, as described in *Interventions that Work* (Dorn & Soffos) and

Apprenticeship in Literacy , 2nd ed (Dorn & Jones) will be revisited throughout the presentation to illustrate how it looks in classrooms.

In Dorn's figure, the following occurs:

- The teacher creates the environment to stimulate students' awareness of what they already know and scaffolds students to notice the relationship between the known information and the new learning task.
- The teacher interjects new learning into the known experience, and the students integrate the old information into the new information, while reflecting on the relationship between the sources as applicable to the learning goal.
- At this point, the students' knowledge begins to undergo a transformative process, which is a result of the integration of old and new knowledge. This transformative process is a critical point in future learning.
- This integration enables students to make an informed decision – an abstract hypothesis based on evidence from multiple sources of information.
- The transformation of knowledge continues as the process is actively tested.
- The testing and confirming of the knowledge leads to the construction and creation of new knowledge.

Teacher on the Sideline:

- Arranges environment to activate students' background knowledge.
- Introduces new learning and provides adjustable scaffolds to promote integration and reflective analysis.
- Encourages student decision-making based on multiple evidences.
- Creates opportunity for student to test information through reading, writing, and speaking.

Background knowledge plus strategic knowledge leads to the construction of new knowledge. The teacher serves as the scaffold for keeping the students' learning at the cutting edge.

Reading acceleration occurs on tasks and materials that are challenging and engage the child's mind in productive reading work. The teacher keeps the child's learning at the cutting edge, thereby pushing the boundaries of the child's learning to increasingly more complex levels through assisted performance.

A problem solving cycle requires learners to engage in systematic, goal-orientation actions:

- Initiate a plan of action for solving the problem
- Perform the action
- If the plan works, continue with the task
- If the plan doesn't work, search for the next step in solving the problem,
- Check the results, make a decision, and self-correct

- Learn from the problem.

During meaningful literacy events, teachers prompt students to talk about their learning. Talk and action work together to shape students' thinking. The first step in intellectual development is awareness.

How does this apply to the struggling reader? Who is the struggling reader? The struggling reader is one who has the necessary cognitive tools to be a successful reader, but has developed a breakdown in strategic processing and metacognition, and as a result is experiencing difficulty with controlling and managing cognitive resources in a reflective, purposeful way. (Source: Gersten, Fuchs, Williams, & Baker. (2001). Teaching Reading Comprehension Strategies to Students with Learning Disabilities: A Review of Research. *Review of Educational Research*, 71, 279-320).

Conditions of reflective thinking:

- Conscious awareness (I know what I know)
- Selective attention (I can focus my attention on what is important)
- Voluntary memory (I can use my memory in intentional ways to help me remember what is important)

Explicit instruction and student articulation develop awareness and reflection (show example from Kindergarten writing workshop where students are using writing checklist to reflect on their writing).

When we look at something, the eyes map this image into the brain. What does this mean for teaching?

Bits and pieces of visual stimuli are assembled into a meaningful image. Teachers create the experience that activates the assembly of visual data into meaningful images.

Teaching Goal- to help students understand the structure of personal narrative. Make it meaningful by beginning with the concrete (show examples of using graphic organizer and illustrate with video episodes from Dana's 3rd grade writing workshop).

See figure of Integrated Workshop Framework from *Interventions that Work*, 2011, Dorn & Soffos and *Apprenticeship in Literacy*, 2nd edition 2012, Dorn & Jones. The figure illustrates how four workshops (language, content, reading, and writing) are integrated to promote transfer of knowledge across changing contexts.

Language Workshop

During a unit of space, Dana has been reading aloud mentor texts about the solar system and creating anchor charts and maps to highlight vocabulary, language conventions, and text features.

Content Workshop

During content workshop, Dana and the students have been studying the solar system, conducting experiments, and collaborating on projects about space.

Reading Workshop

In small groups, the students have been reading informational texts about space and engaging in collaborative research projects using the classroom library and the Internet.

Writing Workshop

During mini-lessons, Dana has demonstrated how to write informational text using knowledge they have gained from reading. As students write independently, Dana conducts writing conferences and prompts toward independence.

Transcript of Teacher Prompting During Student's Writing Conference

T: So, what are you going to do now?

(Prompts Student to Articulate Plan)

T: So, you've got them numbered to help you see in what order you're going to put your things.

(Summarizes Student Plan)

T: So what are you thinking as you write about the orbit of Saturn? How are you going to help your reader understand your message?

(Prompts Student for Next Step in Planning)

T: That was a great way to start your paragraph. That will help your reader to understand that it takes a lot longer for Saturn to orbit the sun.

(Provides Explicit Feedback on Plan and Rationale)

T: I'll let you keep working and then I'll come back and check on you in a few minutes.

(Promotes Accountability)

Questions to Ask:

- Is my teaching helping the student to initiate and carry out a plan of action?
- Is my teaching consistent and focused?
- Is my prompting fostering independence?
- Will the student be able to transfer the knowledge gained in the teaching interaction to a different situation?

Scaffolding occurs along a continuum of complexity:

- Simple to complex task
- More to Less Assistance

Illustrate scaffolding concepts with video examples from kindergarten during writing conference with teacher and from eighth grade writing conference with peers.

Examples of Prompts for Promoting Reflection and Independence (all examples are taken from Dorn & Jones, 2012, *Apprenticeship in Literacy* 2nd edition. Stenhouse)

Prompting for Reflection

- How do you think you did on that?
- Where do you think you did your best work?
- Can you find a part that you would like to spend more time on?
- Did you have any problems with this part?
- Show me the hardest part?
- As you look back on your work, what changes do you see?
- How has your reading (or writing) changed since the beginning of the year?

Prompting for Problem Solving

- What have you tried so far?
- What are you trying to figure out?
- What strategy would work there?
- Is there something else you can try to help yourself?
- Why is this easy for you to do?
- What is making this so difficult for you?
- What do you need to work on?
- How can you improve this part?
- What do you know that can help you?

Prompting for Metacognition

- What advice would you have for someone who is stuck on this problem?
- Help me understand how you solved this part.
- Can you explain what you are thinking?
- Why did you decide to try that? Is there anything else you could have tried?
- What can you do to help yourself understand that part?
- How are you doing? Do you need to do anything differently?

Prompting for Transfer

- When you learn how to do this, you will be able to use it to help you solve other problems.
- How can you use what you learned in reading to help you in writing?
- How is this like what we learned yesterday?
- Where have you noticed this word before?
- Have you encountered this type of problem before?
- Where have you used this strategy before?

Non-verbal scaffolds are resources that children use to assist their performance on particular literacy tasks. For a non-verbal scaffold to be effective, teachers first introduce the resource in an assisted situation, including an explicit demonstration of how to use the resource as a self-help tool. It is essential that children understand the purpose of the tool for assisting their performance. (See *Apprenticeship in*

Literacy, 2nd edition for examples of non-verbal scaffolds).

Scaffolding Students to Think at Deeper Levels During Book Discussions in Intervention Group

- 1) Introduce the genre and provide a brief overview of the book
- 2) State a purpose for reading, e.g., 'read to find out . . .'
- 3) Hold an individual conference to check on comprehension and to prompt for deeper understanding
- 4) Conduct book discussion using 3 or 4 mediating prompts to promote deeper understanding
- 5) Prompt students to write about the text in their response log

In closing, let's return to the 3 big ideas and relate them to the Common Core State Standards:

Big Idea #1 Alignment to CCSS

- Learning progresses along a continuum of simple to more complex ideas and concepts.
- The learning goal is to integrate information across multiple experiences and to develop deeper understandings through relationships.
- Teaching is designed to revisit evidence-based ideas and build on these experiences to create future knowledge.
- Teaching keeps students' learning at their cutting edge through assistance at critical points.

Big Idea #2: Alignment to CCSS

- Modeling provides an image of how experts construct knowledge in order to accomplish a particular goal.
- Scaffolding is continually adjusted to accommodate student learning, and to promote student independence on complex tasks.
- The goal of teaching is to move students' learning from the external to the internal, thus promoting their understandings of critical ideas and concepts for future learning.

Big Idea #3: Alignment to CCSS

- Students must read more complex texts with deeper understandings.
- For struggling readers, teachers will need to increase the scaffolding on harder tasks, in contrast to watering down the curriculum.
- An integrated framework provides a design for balancing rigor and support, and promoting transfer across multiple contexts.