The Reading Brain in a Digital Culture: What are the Implications for New Readers and children with Reading Difficulties?

Ellen Engstrom – Director of Education
engstrome@grovesacademy.org
Todd Hanson – Director of Technology
hansont@grovesacademy.org
Groves Academy
St. Louis Park, MN
www.grovesacademy.org
Agenda

• The Reading Brain

• Reading Difficulties

• The Digital World

• Digital Text

• Technologies for Reading
The Cultural Shift from Oral to Written Language

• Human knowledge used to be preserved and shared through memory and story telling.
• Reading and writing became widespread in ancient Athens.
• Philosophers warned that this new cognitive and technical invention would change human communication and transform the way knowledge would be developed and used.
• The result: **Literacy**
  – Accelerated the storage and retrieval of knowledge
  – Reduced the memory and rhetorical demands on the brain
• By altering the way we communicate, generate, and probe information, we alter the way the brain functions.
The Reading Brain

• Human language has evolved over thousands of years and is so robust that nearly all children acquire it effortlessly.
• Reading is not natural and is effortful and time consuming to learn.
• Reading is a cultural invention that is passed from generation to generation through modeling and teaching.
• Reading is learned and mastered through a rewiring of already existing systems (vision, oral language) that are genetically programmed.
  • How is that possible?
The Brain’s Design Principles

• Neuroplasticity
  – Permits totally new connections
  – Allows different groups of cells to communicate

• Groups of neurons can become “specialists” that target specific tasks
  – In reading, neurons must be specialized for accurate and efficient pattern recognition in visual and auditory domains

• Once neurons are connected, they can strengthen those connections so certain tasks become automatic: fast and effortless

• Result? Reading brains are formed based on the demands of different writing systems. (English alphabet vs. Chinese script)
Fluent, Expert Reading

• Each individual reader must create the brain circuit for reading from its own perceptual, linguistic, and cognitive systems.

• Skilled readers learn to **automatize, integrate, and precisely time** the network of interrelated perceptual, linguistic, and cognitive skills.

• Reading difficulties can occur through any delay or interruption in the creation of any piece of the circuit or inability of any parts of the system to achieve automaticity.

• The reading circuit relies on speedy recognition of phonemes and graphemes and the ability to associate this information with semantic content.
Reading Difficulties

• Breakdowns in the reading circuit:
  – Failure to automatically associate orthographic patterns with phonological forms
  – Slow retrieval of phonological and/or orthographic representations
  – Failure to develop rich semantic content (to know words)

• Inadequate early childhood experience with rich language contributes to reading failure in multiple domains.
The Cultural Shift from Print to Visual/Digital Media

• Digital text is everywhere
  – Computer screens
  – Tablets
  – Mobile phones
  – E-Readers
  – Wearable technology
  – Apps

• Reading is less effortful with text to speech software.

• Spelling, grammar, handwriting, and keyboarding are less important thanks to voice recognition software.
Digital Text

• Portability
• Availability / Access
• Hyperlinks
• Adaptable
• Assistive Technologies
Text Readers and Reading Systems

• Convert digital text to spoken words
• Readers can process text aurally, or aurally and visually
• Reading systems include study skills tools so students can:
  – Highlight text
  – Add margin notes, sticky notes, or footnotes
  – Extract notes and highlights
  – Find word definitions in a dictionary or thesaurus
Benefits of text readers

- Students can read large quantities of text in a shorter time
- Students can access digital content, such as websites, research, online forms, and textbooks
More Benefits...

- Provides aural feedback during and after writing
- Enhances the correspondence between spelling, word identification, and sounds in words
Reading Technologies

- Google Chrome Add-ins and Extensions for the web
  - Speakit
  - Cortexit
  - Readability

- Kurzweil 3000
  - Reading, web, content creation, and study skills

- Read and Write for Google
  - Reading, web, Web simplification, content creation, and study skills
• “It would be a shame if brilliant technology were to end up threatening the kind of intellect that produced it.”

» Tenner (2006)
The Brain Reading Online

• Reading on a screen encourages more skimming behavior
  – People browse and scan
  – Look for keywords
  – Read selectively, less linearly
    • Liu (20??)

• Online reading is more exhausting than the printed page
  – Need to filter out hyperlinks and distractions
  – Eyes tire from shifting screens, layouts, colors and contrasts
  – Each adjustment takes mental and physical energy
  – Comprehension is worse compared to reading print
    – Konika (2014) Being a better online reader, The New Yorker
Different Approaches to Reading

Deep Reading
• Slow, immersive process
• Characterized by inference, analogical thinking, critical analysis
• Facilitates contemplation leading to insight and epiphany
• “Reading is a bridge to thought” – Maryanne Wolf

Online Reading Characteristics
• Rapid firing
• Partial attention
• Demand for immediate information
• Efficient multi-tasking of diverse sets of information
The Task Ahead

• Teach active reading strategies
  – Living with the text (multi-pass)
• Slow down online reader
• Study: interactive annotation component helped improve comprehension and reading strategy use in fifth graders
• Teach self-regulation
Reading Comprehension

• Extract and construct meaning through interaction with written language

• Three components
  – The reader
  – The text
  – The purpose

• Comprehension process is active, not passive

Rand Reading Study Group (2002)
The *Super Seven*: Comprehension Strategies with Strong Scientific Support (NICHD, 2000)

- Comprehension monitoring
- Cooperative learning
- Graphic and semantic organizers
- Question answering
- Question generation
- Story structure
- Summarization

Most effective when used in combination!
The Active Reading Strategy

Preread
Read
Highlight

Proofread
Summarize
Chunk

Text to Speech
Graphic Organizer
Word Processor
Text to Speech
Margin Note
“The same plasticity that allows us to form a reading circuit to begin with, and short-circuit the development of deep reading if we allow it, also allows us to learn how to duplicate deep reading in a new environment.”

“We cannot go backwards. As children move more toward an immersion in digital media, we have to figure out ways to read deeply there.”

-Maryanne Wolf (2014)
Two Nations of North America

Where Can You Find?
Where can you find the tallest place in North America?

Two friends are visiting a large shopping mall in North America. The sound of rock music can be heard in many of the stores. Some of these stores sell jeans and sweatshirts. Other stores sell toys, telephones, or books. The two friends buy hamburgers for lunch. Can you tell if this mall is in the United States or in Canada? It may be difficult to tell because both nations are alike in many ways. The signs in the mall can give you the answer. The signs in this mall are in both English and French. Both English and French are the official languages of Canada. The United States does not have an official language. Most people in the United States speak English as their main language.

Understanding the Land and the Climate

The United States and Canada are the two largest countries in North America. Canada is the world's second largest country in size. The United States is...
Water continually cycles.

**BEFORE,** you learned

- The form of running water
- Water can be solid

**NOW,** you will learn

- What makes water important
- Why water is important
- Water moves throughout Earth and its atmosphere

**VOCABULARY**

- freshwater p. 11
- saltwater p. 12
- water cycle p. 12
- evaporation p. 10
- condensation p. 10
- precipitation p. 10

**EXPLORE Water Vapors**

**Where does the water come from?**

**PROCEDURE**

Add 1 cup of water to an 8 oz glass.

**WHAT DO YOU THINK?**

- Could I put a paper towel on the surface of the glass and leave it there?
- What does the water say about the air surrounding you? What condition can you draw?

**Water is a unique substance.**

Sweat from sweat glands, both glitters like a beautiful blue and white mosaic. Welcome to the "water place." We truly live in a watery world, as our oceans are vast masses of liquid water.

Because of water, a truly amazing substance, life can exist on Earth.

What is an amazing about water? The temperature range we have on Earth is more extreme than a vast array of liquids and gases. At a low temperature, water freezes. It becomes a solid, which is ice. At a higher temperature, if there needs to liquid forms. Liquid water can become a gas, especially at higher temperatures. If there ever noticed how something that changes in the last cold, you have observed that water can turn into ice, or back again. The gas form is the invisible water vapor in our atmosphere.

**Liquid water can be any shape.** It can hold into shape like a needle, then change into other shapes like snowflakes. It will slow down and fall at the continents in a lake.
Read and Write for Google

Technology

Over the past four years the teachers at Groves have explored and implemented teaching approaches that balance technological and non-technological methods that work to give each student the best learning experience possible.

1:1 Laptop Program

Groves Academy's 1:1 laptop program for our Upper School and Middle School has been in place since 2009. In 2013 all Lower School classrooms received a set of laptops to be used by the students in the classroom. This "always present" model of computing provides an arena for student growth that is not available in other school computing models. Our one-to-one program is more than an infusion of technology into the school. It is a way to examine education’s best practices and determine what can be enhanced by technology. The availability of technology and continuous connectivity has caused Middle and Upper School teachers to redefine the ways they give and collect homework, communicate with parents, and assess student learning.
Google Chrome Apps for Reading the Web

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Assistive Technology

Groves has also made a commitment to prepare our students to use technology as a tool that levels the playing field for those with learning disabilities and attentional disorder. The availability
Where to get Digital Text

- Bookshare.org
  - Free to students with a documented print disability
  - Access varies depending on IEP status

- LearningAlly.org
  - Recordings have human voices
  - Voice text for many books
  - Searchable and accessible
  - Membership fee

- Publisher
  - Many publishers provide online versions of texts

- PDFs can be created by scanning books

- Documents created in MS Word or other word processing program

- Internet
Read and Write for Google

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