Access and Equity: How the Human Brain Learns Language Best

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Access and Equity: How the Human Brain Learns Language Best

• What is access and equity in the classroom?
• How does the brain “work” and how does the brain “learn” best?
• How does the brain learn language and how do we teach learn language most effectively?

Quick writes, fast talks and hands-on experiences...

(... visual examples)
Future Students = Swiss Army knife

- Preparation must be **multi-dimensional creative thinkers** (training for the **Olympics** without knowing the sport in which you will be **expected to compete**).
- **Multi-talented (MI)** – **flexible** thinkers and **creative synthesizers** of information who can solve problems.
Access and Equity for *All* Students
Our students come in a variety of colors, but all brains are basically gray. It is only the gray matter that truly matters in learning and memory.

Maximizing student potential hinges on educators developing a robust knowledge reservoir for teaching with the developing brain in mind.
There is an unseen *implicit curriculum* (like “smog in the air” – no formal coursework needed) that our “different” students “feel” from the treatment that they (and people like them) receive everyday. It is often *more* powerful than the *explicit* curriculum.
Who is intelligent?
Who is “normal”?
Who is “a problem”?
Who is “deficient”?
What constitutes beauty?
Whose culture is admirable?
Whose customs are strange?
Whose language is “standard”?

Who decides? Who will benefit? Who loses?
What are the consequences for each?
Access, Equity, and Inclusion

ANGLO and NON-ENGLISH SPEAKING BACKGROUND

- Exhibit Leadership
- Assertiveness
- Allocated Major Projects
- Communicates Clearly
- Builds Business Relationships

Chart showing comparison between Anglo and Non-English speaking groups.
Access, Equity, and Inclusion

Be Cool, Follow The Rules

Cool

Not Cool

Pool Rules

American Red Cross
Access, Equity, and Inclusion

• Over **50%** of the people born today are multi-racial, multi-cultural, multi-religious, or from parents of other **non-traditional unions**.

• **Diversity** is where **learn** both professionally and personally through **new experiences**, make new **connections**, and expand our ability to navigate in other cultures and with other people from around the world.
Access, Equity, and Inclusion

Implicit bias
Third-grade teacher Jane Elliot divided her students into groups of brown-eyed and blue-eyed children. She told the class that it had been discovered that brown-eyed children were superior to blue-eyed children in every way, and that from now on the brown-eyed children would receive their well-deserved special treatment. The two groups of children internalized their new status and the new rules. The blue-eyed children became despondent and were emotionally defeated.
Case Study: A Class Divided

- The blue-eyed children were not allowed to play with their superiors, the brown-eyed children.
- The blue-eyed children lost interest in playing at recess.
- The blue-eyed children began to misbehave in class, began answering fewer questions, and began to perform poorly on tests (“self-fulfilling prophecy”).
Researchers administered the Stanford-Binet Intelligence Scale-V to (30+) 1st grade students at the beginning of the school year. “The test results indicate that 5 students scored at or above the genius level (140).” → Confidentiality agreement: Teacher could not share the test results.

- Monitored the behavior of teacher & students
- At the end of the academic year, the students were re-tested to determine if there was any variance from the first set of IQ scores.
- Q: Guess how many scored at the genius level on the second administration of the test? Who? Why?
Mindsets: Expectations

- A: The **same 5 students**.
- However, *their* scores on the 1st test were *not* even close to the **best scores** – only slightly ↑ average.
- The quality of her teaching, her **treatment**, and her **expectations** ↑ the test scores of the 5 targets.
- Her efforts to “keep” them at the ↑ performance level, “elevated” them to ↑ level in the classroom.

* The **results** we get from students, often reflect what we **expected from** those students and how we nurtured them (causal effect) to achieve.
Access, Equity, and Inclusion

“They speak my language.”

• Commonality promotes comfort - “affinity bias”.
• **Affinity bias:** We use the same neural pathways to process feelings about *ourselves* as we use for processing feelings about people who are *like us* or part of our “in-group.” Safety - survival.
• However, we use completely *different neural pathways*, when processing information about “out-group” members.
• We show more empathy with which group?
• We think *less favorably* of the “out-group” members, we are *less sympathetic* with them, their problems (even if we are responsible for their problems) we demonstrate *less empathy* if they (one or all) have a negative experience, and we are *indifferent* to their success or failure.
Access, Equity, and Inclusion

SCIENCE SAYS..

- Better problem solvers
- More creative
- More diligent
- Innovated
- New viewpoints
- Harder working

Diversity makes us smarter.
Researchers found that more diverse groups out-performed homogenous groups in P-S and creative thinking tasks. They were more innovative, more productive, arrived at more solutions. Companies with more diversity are more profitable.
What formal education for one child for one year depends on what his/her teacher believes, knows, and does – and doesn't believe, doesn't know, and doesn’t do.
Children/students (young brains)...

- grow at different rates
- learn at different rates
- learn in different ways
- reach proficiency in skills more effectively through different strategies/means
- They learn some content information slowly, and other types of information quicker and more deeply (with different strengths, outcomes, & on timelines)
- Cannot teach all students at the same pace in the same way, assuming they all have the same dev’il history (a broad range of “diversity in learning”).
A Teacher’s Mindset

- Knowing **who** you teach (a child with 100B neurons capable of making an infinite number of learning **connections** for a lifetime) is just as important as **what** you teach (disciplinary content).

- “I teach science.” No, you teach **students** whose brains prefer to learn by actively **making elaborate connections** inside their brains.
Culturally-relevant Pedagogy

• “I treat all of my students the same.” Is a formula for ineffective teaching recognizing that all students are different.

• Five children from the same family are often quite different, and parents know that it is wholly ineffective to try to treat each child exactly the same. Treating them equitably (based on needs, disposition, personality, etc.) is the goal rather than sameness.

• Neither educating nor parenting works that way. “I treat everyone in my family the same,” – would not recommend treating your wife like she was one of your children?
Diversity refers to the myriad ways in which individuals are unique and different from one another.

Equity denotes that all individuals should be treated fairly both because of and in spite of their differences.

Access means that each diverse individual can take advantage of all of the resources available, and that there are no restrictions on opportunity (the achievement gap = “opportunity gap”).
Access, Equity, and Inclusion

Targeted groups in CA (“High-need” – Different needs)

- Non-standard English Learners
- English Learners
- Ethnically Diverse Learners
- Foster Youth
- Girls and Young Women (Gender Equity)
- Advanced Learners and Gifted Learners
- Students with Disabilities
- Students Experiencing Difficulties with Literacy in Science and Engineering
- Students Living in Poverty (the common thread)
All learners *cannot* be treated the same because their different learning, social, cultural, linguistic, emotional, and physical needs naturally give rise to varying interventions that will be effective for them to achieve, but perhaps not for others.

-- Bradley Scott, 1995
Our “Differences”

Like an orchestra, where each instrument is different, and each of them plays something that is completely different than each of the others, but the sum total of what they produce together is what we all consider to be exceptionally beautiful to the point of sometimes even being emotionally moving music.
How does the human brain "work" and how does it "learn"?
Good thinking is a matter of making connections, and knowing what kinds of connections to make.

---David Perkins
The neural basis of cognition rests in the work of the neurons.

**Ensemble of neurons**

*Ensemble of neurons*

**Infants…**

100 billion = Number of neurons that we are born with (full-term)

Learning = building a neural pathways to store what we have experienced → a change in brain circuitry
“How does the brain learn language most effectively?”

Spoken language
The magic of human language

Language is one of the most crucial accomplishments created by the human brain, although learning to speak has the appearance of an ordinary phase in child development. Virtually any person can learn one or more of the 6,000 languages spoken today. Our 100 billion interconnected neurons actively seek neural auditory stimuli in order for the brain's language system to develop.

Multi-sensory experience is ideal for language development. It often takes different exposure—singing, hearing, reading, writing—before information moves into long-term memory. Experience is enhanced for associations to a green word.

When a new concept is processed, its elements are stored in numerous interconnected neural networks throughout the brain. Memory is easier to recall when there are several routes back to the source. The definition for a word is coupled with other words to which it is sequentially linked. Retrieving the memory of a word simultaneously recalls the memories of other associated words. "Word nets" are incredibly effective language-learning tools that enhance the power of a single word but also create other words out of linking during thinking, speaking, listening, reading, or writing.

The more frequently that specialized language patterns in the brain fire together, the more they are permanently "hardwired" themselves together for increased understanding.

What have we learned about teaching language to the cerebral cortex? Teaching any language should not begin with a random, formal experience in the visual world. Human beings have always been born to learn, but not born to read the branch relating mental circuits (as in reading). The more frequently that specialized language patterns in the brain fire together, the more they will be permanently "hardwired" themselves together for increased understanding.

The language connection to art and music

Music culture introduces infants to infant language development by singing songs and melodies to babies, later teaching them to move their bodies to the music, which adds another dimension to language development by connecting it with the brain-body circuitry. Music, typically correlated with right-hemispheric function, has historically been one of the most effective tools for language development.
<table>
<thead>
<tr>
<th>colorectal</th>
<th>diatomaceous</th>
</tr>
</thead>
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<tr>
<td>adenocarcinoma</td>
<td>Pachyrhinosaurus</td>
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<td>diverticulitis</td>
<td>amniocentesis</td>
</tr>
<tr>
<td>Australopithecus</td>
<td>Panoplosaurus</td>
</tr>
<tr>
<td>microscopy</td>
<td>Dimetrodon</td>
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<tr>
<td>deoxyribonucleic</td>
<td>Epacthosaurus</td>
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<td>phenothiazine</td>
<td>cholecystography</td>
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<tr>
<td>diencephalon</td>
<td>electroencephalograph</td>
</tr>
<tr>
<td>epithelium</td>
<td>Homo neanderthalensis</td>
</tr>
<tr>
<td>hypochondriasis</td>
<td>phenylethylamine</td>
</tr>
<tr>
<td>neurosarcoidosis</td>
<td>phenylthiocarbamide (PTC)</td>
</tr>
</tbody>
</table>
Reverse Direction Decoding

**Dactyloscopy:**
The practice of using fingerprints for personal identification

**dak-tu-los'ku-pē**

(-py) = pē
(-copy) = ku-pē
(-loscopy) = los'ku-pē
(-tyloscopy) = tu-los'ku-pē
**dactyloscopy** = dak-tu-los'ku-pē
Colorectal
Adenocarcinoma
Diverticulitis
Australopithecus
Microscopy
Deoxyribonucleic
Phenothiazine
Diatomaceous = Diatomaceous
How Reverse Direction Decoding Works
Revolutionizing How We Teach Reading
by Kenneth Wesson

A short list of humankind’s greatest achievements would undoubtedly include the use of tools, language and technology. Reading and writing have become so second nature to educated individuals that reading is taken for granted; but by readers only. Literacy can not only alter the success-trajectory of our lives, but the process of learning how to read “literally” alters brain circuitry, the physiology and architecture of the human brain. In addition to listening to words, we read words, use words in speech, and even think in words.

Phonics is the popular reading strategy commonly taught in preschool, primary and upper elementary grades, and sometimes still in middle schools. However, shouldn’t any technique used repeatedly for almost 10 consecutive years with only modest success warrant some suspicion? Worst of all, the word “phonics” does not conform to its own rules. The mere fact that it is not spelled phonetically should have generated suspicions about the theory! It has produced millions of “phonics-damaged children” according to some researchers.
The foundations of human learning and all of our competencies are set during the early years.
Innatist theory of language acquisition:
Language learning is natural for human beings, whereby babies are born into the world with an inborn biological propensity to learn language.
We get language out into the *external* world as a sequence of buzzing and humming sounds that we can make as we *exhale*.

- At the top of our trachea - a complex structure, the **larynx**, where air from your lungs goes past two **cartilaginous flaps** that vibrate and produce vocal sounds – voice harmonics
- Before the vibrating sound is released, it must pass through a series of **cavities** that we can control by **changing their shapes** (moving the tongue around, and by shaping/reshaping the **lips, cheeks and jaw** – infants'/toddlers’ fixation – Mirror neurons
- We can block off air flow → forcing some air through the **nasal cavity** → n’s and m’s.

*All speech is governed by these simple laws of physics.*
Active Brain-building Begins Immediately After Birth!

✓ Research has found that as early as 6 months of age, infants can understand words; at 7 months, they begin practicing words in their head.

✓ It’s important to talk to babies, make eye contact, play simple games like peek-a-boo, reading books together. Let the child turn the pages and discuss the content/pictures.
<table>
<thead>
<tr>
<th></th>
<th>Optimal window</th>
<th>Secondary Window</th>
<th>Extent of Future Developmental Possibilities</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Vision</strong></td>
<td>0 – 6 months</td>
<td>6 – 24 months</td>
<td>The lack of visual stimuli entering the eyes will eventually cause permanent blindness in a perfectly healthy eye. (Primary visual cortex must process incoming visual information.)</td>
</tr>
<tr>
<td><strong>Motor development</strong></td>
<td>0 – 24 months</td>
<td>2 – 4 years</td>
<td>Capabilities rapidly decrease with advancing age. (Functionality of the cerebellum/motor cortex for balance/coordination can be lost).</td>
</tr>
<tr>
<td><strong>Auditory development</strong></td>
<td>0 – 6 months</td>
<td>6 – 18 months</td>
<td>Severe learning and language problems will result from CAPDs based on the lack of stimuli processed by the auditory cortex. Problems occur from the absence of any sounds to handle and/or distinguish.</td>
</tr>
<tr>
<td><strong>Language skills</strong></td>
<td>0 – 24 months</td>
<td>2 – 5 years</td>
<td>With the onset of puberty, “new language” mastery begins a sharp and typically uninterrupted decline.</td>
</tr>
<tr>
<td><strong>Reading skills</strong></td>
<td>4 – 5 years old (girls)</td>
<td>7 – 12 years old (puberty)</td>
<td>Learning to process symbolic language can occur throughout one’s lifetime. It becomes more difficult (1) with time, and (2) if there are only modest opportunities for auditory processing of the rich usages and varieties of ideas. Early drawing provides a foundation for languaging.</td>
</tr>
<tr>
<td><strong>Emotional development</strong></td>
<td>0 – 24 months</td>
<td>2 – 4 years</td>
<td>Screening events through one’s emotional filter becomes difficult; personal relationships are characterized by weak attachments that are easily terminated. (Similar to limbectomized mammals)</td>
</tr>
<tr>
<td><strong>A second language</strong></td>
<td>0 – 5 years old</td>
<td>7 – 12 years old</td>
<td>Learning a second language after puberty is far more challenging than language learning at any other prepubescent period. The “second” language will almost invariably be accompanied by an accent.</td>
</tr>
<tr>
<td><strong>Musical abilities</strong></td>
<td>0 – 6 years old</td>
<td>7 – 12 years old</td>
<td>Research suggests that early musical exposure enhances the development of spatial and mathematical skills. Beyond puberty, learning a musical instrument (particularly learning to read musical notation) is frequently as complicated as learning a new oral language.</td>
</tr>
</tbody>
</table>
The Role of Experience in Learning

Everything that we **do, feel, say and experience** from infancy to the end of life is reflected in the ways that our **brains get “wired”**.
Brain-building Occurs Over Time

A child’s brain is not merely a miniature version of an adult brain. It is wired differently; various regions of the brain are on a different developmental trajectory than others.

“Developmentally appropriate”
Experience → builds the representative network
“Re-purpose” the same cells for participation on countless related brain circuits
Connectionism (Dynamic Brain Systems)

- Ball
- Baseball
- Round
- Yellow
- Basketball
- Tennis
- School bus
- Taxi
- Egg yolk
- Brown
- Coconut
- Banana
- Fruits
- Orange
- Pineapple
- Connectionism (Dynamic Brain Systems)
I am currently under construction. Thank you for your patience.

- Children: “I’m always in the midst of building new schemas with my prior knowledge or experiences not matter how limited they may be.”
- Preconceptions and misconceptions
Abandoning Our Cognitive Frames and Changing the Narrative

Our best instructional efforts require a shift from…

“What am I supposed to teach?”

to

“How do my students learn?”
How Did You Learn Best?

1. By a show of hands, how many of you enjoyed most of your K-12 science classes?

2. Raise your hand if you enjoyed biology most.
   - Physics
   - Chemistry
   - Astronomy
   - something else?
How the Brain Learns Best: By Experience

What do you remember about the class(es) and why was the learning so unforgettable to you?
1. People learn and remember best through real-world first-hand experiences, not through memorization.

2. Children are born investigators.

3. We attempt to “make sense” of all incoming stimuli through the senses, visualization, and through formal language development.
How Do Children Learn Best?

1. Give them something to do (activating the senses)?
2. Give them something to think about?
3. Give them something to talk about? (BBK)
4. Whenever possible, have young students first draw what they will later write about (using the pictures in the “mind’s eye”)
5. After students do, think, talk about and draw the target concept (experience it), then we can say that they “know” it.
Take an Apple

- Look at it
- Touch it
- Feel it
- Hold it
- Smell it
- Cut it
- Taste it
- Listen to it
<table>
<thead>
<tr>
<th>Adjective</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red</td>
<td>Plump, speckled</td>
</tr>
<tr>
<td>Smooth</td>
<td>Creamy pulp, solid</td>
</tr>
<tr>
<td>Sweet</td>
<td>Tart</td>
</tr>
<tr>
<td>Moist</td>
<td>Dark</td>
</tr>
<tr>
<td>Wet (inside)</td>
<td>Reflective, chartreuse</td>
</tr>
<tr>
<td>Rounded</td>
<td>Divot at stem, divot at base</td>
</tr>
<tr>
<td>Brown stem</td>
<td>Internal green spots</td>
</tr>
<tr>
<td>Pointy</td>
<td>Tangy smell, leafy smell</td>
</tr>
<tr>
<td>Yellowish</td>
<td>Quiet/silent, stationary</td>
</tr>
<tr>
<td>Inside spots</td>
<td>Satisfying smell, rolls</td>
</tr>
<tr>
<td>Cold</td>
<td>Green</td>
</tr>
<tr>
<td>Juicy</td>
<td>Delicious, fibrous, crunchy</td>
</tr>
<tr>
<td>Rough on outside</td>
<td>Crunchy, nutritious</td>
</tr>
<tr>
<td>White inside</td>
<td>Tart</td>
</tr>
<tr>
<td>crunchy</td>
<td>Bruised, bruised, almond-shaped seeds</td>
</tr>
<tr>
<td>turning brown inside</td>
<td>Tasty</td>
</tr>
<tr>
<td>shiny</td>
<td>White inside, dry - externally</td>
</tr>
<tr>
<td>waxy</td>
<td>Satisfying smell, rolls</td>
</tr>
<tr>
<td>hard</td>
<td>Leathery skin, ringed, freckled</td>
</tr>
</tbody>
</table>

Word Wall: “Describe the Apple”
Describe the Apple in this Picture

1. Smell
2. Hearing
3. Touch
4. Taste
5. Sight
Word Wall: Describing the Apple

Red
Smooth X
Sweet X
Moist X
Wet (inside) X
Rounded
Brown stem
Pointy
Yellowish inside X
Inside spots X
Cold X
Juicy X
Rough on outside X
White inside X
Crunchy X
Turning brown X
Inside
Shiny
Waxy X
Hard X

Plump
Speckled X
Creamy pulp X
Solid X
Tart X
Dark
Reflective
Chartreuse
Divot at stem X
Divot at base X
Internal green spots X
Tangy smell X
Leafy smell X
Quiet/silent X
Stationary X
Sour X
Bruised X
Almond-shaped seeds X
Tasty X

Small X
Blush X
Height – 6 cm X
Diameter – 7 cm X
Base --3 cm X
Leathery skin X
Ringed X
Freckled X
Fresh X
Dry – externally X
Pleasant smell inside X
Rolls X
Green
Delicious X
Fibrous X
Crunchy X
Nutritious X
Tart X
What does reading this word tell a young learner, if he’s never experienced an apple?
The Word Only? → Eliminate the Following

- Red
- Smooth
- Sweet
- Moist
- Wet (inside)
- Rounded
- Brown stem
- Pointy
- Yellowish
- Inside spots
- Cold
- Juicy
- Rough on outside
- White inside
- Crunchy
- Turning brown
- Shiny
- Waxy
- Hard
- Plump
- Speckled
- Creamy pulp
- Solid
- Tart
- Dark
- Reflective
- Chartreuse
- Divot at stem
- Divot at base
- Internal green spots
- Tangy smell
- Leafy smell
- Quiet/silent
- Stationary
- Sour
- Bruised
- Almond-shaped seeds
- Tasty
- Small
- Blush
- Height – 6 cm
- Diameter – 7 cm
- Base --3 cm
- Leathery skin
- Ringed
- Freckled
- Fresh
- Dry – externally
- Pleasant smell inside
- Rolls
- Nutritious (BBK)
- Green
- Delicious
- Fibrous
- Crunchy
- Tart
Word Wall: Describe the Apple

Red      Plump      Small
Smooth   Speckled   Blush
Sweet    Creamy pulp  Height – 6 cm
Moist    Solid      Diameter – 7 cm
Wet (inside) Tart      Base --3 cm
Rounded  Dark       Leathery skin
Brown stem Reflective Freckled
Pointy    Chartreuse Fresh
Yellowish Divot at stem Dry – externally
Some spots Divot at base Satisfying smell
Cold     Internal green spots Rolls
Juicy    Tangy smell Green
Rough on outside Leafy smell Delicious
White inside Quiet/silent Fibrous
Crunchy  Stationary Crunchy
Turning brown Sour Nutritious
inside    Bruised Tart
Nutritious Almond-shaped seeds Sugary
Tasty    Crisp
Slippery

Science Word Wall

Traits:

- deciduous
- pollinate
- coniferous
- germinate
- herbivore
- carnivore
- magma
- atom
- matter
- property
- voltage
- current
- electric
- magnetic
- weathering
- volume
The “Knowledge-rich” Form of Learning

The “symbolic representation” and the “schema” file

All of the “connections”

Word Wall: Describe the Apple

Red
Smooth
Deep
Moist
Wet (inside)
Rounded
Brown stem
Pointed
Yellowish
Some spots
Cold
Juicy
Rough on outside
White inside
Crunchy
Turning brown
Inside
Thin
Waxy
Hard

Plump
Speckled
Creamy pulp
Solid
Tart
Dark
Reflective
Charlottesville
Divit at stem
Divit at base
Internal green spots
Tangy smell
Quizzical
Stationary
Sour
Bruised
Almond-shaped seeds
Tasty
Slippery

Small
Blush
Height - 6 cm
Diameter - 7 cm
Base - 3 cm
Leathery skin ringed
Freckled
Fresh
Dry - externally
Satisfying small
Rolls
Green
Delicious
Fibrous
Crunchy
Nutritious
Tart
Rugby
Crisp

The “sensory experience” with the apple is how we “know/understand” the object itself (via the brain).
alphaTUB – With Meaningful Value

Multilingual & Flexible to teach any language

Creativity & Alphabet Learning

Supports Experiential, Personalized & Individualized Learning

Worls
“The one who does the work, does the learning” (Doyle, 2008).

Learner-driven activities → deep and long-lasting learning
Why is Hands-on **Active** Learning Effective?

**Developmental Neurobiology**

In the “digital age,” it is critical that educators remember that the 10 **digits** on a student’s **hands** are the **first human digital devices** (and remain the most powerful).
Emotions, Attention and Input
"I Have a Discipline Problem."
No! You Have an *Engagement* Problem

**Engagement**

- Phenomena-based learning
- Inquiry (an onslaught of questions)
- Student-centered learning
- Social connections

**Emotions** → attention → learning → memory (integrated in the brain)

Cognitive deprivation: env.’s lacking in consistent sensory and cognitive stimulation, complexity, challenge and feedback
Question:
How do you teach vocabulary best?

Answer: In context

Full answer: In the context of doing (not in the context of reading) and through speaking and writing.

“Predict”
**STEM Vocabulary**

**Instead of saying:**
- “What do you think will happen when...?”
- “Let’s look at these two pictures.”
- “How can you put those into groups?”
- “Let’s work this problem.”
- “What do you think would have happened if...?”
- “What did you think of this story?”
- “How can you explain......?”
- “How do you know that’s true?”
- “How else could you use this.....?”

**Use MINDFUL LANGUAGE by saying:**
- “What do you PREDICT will happen when...?”
- “Let’sCOMPARE these two pictures.”
- “How can you CLASSIFY...?”
- “Let’s ANALYZE this problem.”
- “What do you SPECULATE would have happened if...?”
- “What CONCLUSIONS can you draw about this story?”
- “What HYPOTHESES do you have that might explain...?”
- “What EVIDENCE do you have to support.......?”
- “How could you APPLY this ........?”
We make observations, explain scientific events/phenomena by describing those observations in oral or written forms. We draw inferences from our observations, as well as from the numerical data we collect and organize.
“One characteristic of high-performing schools is an emphasis on teaching non-fiction writing.”

Developing Early Literacy through Active Learning

Four types of vocabulary: although we often speak of vocabulary as if it was singular, humans acquire four types of vocabulary: in descending “size” order

- **listening** vocabulary – (our largest) is made up of words we can hear and understand. All other vocabularies are subsets of our *listening* vocab.
- **speaking** vocabulary (the 2\text{nd} largest) - comprise of words we can use when speaking
- **reading** vocabulary (3\text{rd} largest) - words we can identify and understand when we read
- **writing** vocabulary (our smallest) - words we can use when writing

- **Reading** is heavily dependent upon a robust *listening* and *speaking* vocabulary.
The Achievement Gap

- **Vocabulary** = proxy for knowledge. **Achievement gaps** are **knowledge gaps** primarily sponsored by ever-expanding **academic language gaps**.

- A highly developed vocabulary facilitates **precision**, not just in speaking, but in **thinking**.

- **Lack of vocabulary** can be a crucial factor underlying the **school failure** of disadvantaged students (Becker, 1977; Biemiller, 1999). (They can have a wealth of experiences, but still be poor in “linguistic capital”)

Developing Early Literacy through Active Learning

More than 100 years of research supports the importance of vocabulary development for student success (Graves, 2006). The quickest and most effective means of closing the Achievement Gap is by closing the Vocabulary Gap through active learning experiences where students engage in an abundance of academic conversations.
What Does the Research Say About the Importance of Vocabulary?

- Rupley, Logan & Nichols, 1998/99:
  - “Vocabulary is the glue that holds stories, ideas and content together making comprehension accessible.”
  - Our students’ word knowledge is linked strongly to academic success, because students with large vocabularies can understand new ideas and concepts easier/more quickly than students with ↓vocabularies.
• **Academic vocabulary** is one of the single most important factors contributing to reading comprehension.

• **Students need to add approximately 2000-3500 word meanings** to their reading vocabulary a year.

Source: National Reading Panel. 2002
How We Learn/Understand Vocabulary: Connecting Words with Meaning

- Words are used to **think.** The more words we know, the finer our understanding of the world. -- Stahl, 1999
- Language is **recorded thought.**

**Semantic dementia:** a neurodegenerative disorder → lose touch with the meaning of words. When they lose the word for a specific emotion, the patient can no longer recognize that emotion in other people.

Words are also used to **process** in-coming information, **to understand** and evaluate other’s ideas, and **to understand** still **other** words.
The 30-Million Word Gap

- Research shows that **vocabulary knowledge** is profoundly influenced by **SES**. By age 4, the average accumulated experience with words for children from…
  - professional families = approx. 45M words
  - working-class families = 26M words
  - welfare families = only 13M words.
  (Hart & Risley, 2003)

- Research from Keith Stanovich found that kids who have a **solid word base** get ahead faster and achieve more in school, while children with a less-developed vocabulary to progress more slowly. K-students in lowest 25% for vocabulary development are 3 grades behind by Gr. 6.

- Arizona Dept. of Corrections estimates their projected jail beds needs based on 3rd Grade reading failures as one of the factors.
According to the research of Kumanyika & Grier (2006) and others, poor children often...

- did not attend preschool
- have less access to computers and the Internet (and knowledge to use them efficiently)
- add half as many words annually to their vocabularies, when compared to their more affluent peers – putting them on a slower trajectory for vocabulary development → influencing language acquisition → the development academic language → decreasing the probability of academic success
- have fewer books, toys, and other recreational or learning materials at home
Developing Early Literacy through Active Learning

Environmental print:

• The print one finds in signs, displays, billboards, labels, cereal boxes, storefronts during the everyday living within an environment.

• Researchers found that 60% of three-year-old children and 80% of four and five-year-old children can read some environmental print.

• Most important researchers found that children made significantly more errors recognizing words when they were presented without the environmental context. Children read the entire context, not just the print (Hiebert) -- made connections/associations.
**Commonalities in CCSS & NGSS**

**Vocabulary: Science-centered Language Dev.**

- Highlight *vocabulary integration* rather than “vocabulary acquisition” across the curriculum (not in the traditional “silo insolation” or only during Language Arts).

- Learn vocabulary by means of a broad range of multidisciplinary language experiences.

- Students learn to appreciate the *utility* of his/her growing vocabulary *in the context* of:
  - √ doing and discourse
  - √ speaking and listening
  - √ reading and writing

- **All teachers** must develop a level of comfort in providing *vocabulary instruction* in their subject-area.
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All children, and particularly children from language-impoverished backgrounds, benefit most from classroom/learning environments that are:

- **Experience-rich**
- **language-rich** (“serve and receive” verbal interactions -- primary caregiver feedback)
- **print-rich** (classrooms with word walls, writing samples, books of every genre, *real-world* objects, etc., and homes where parents/siblings *model* that *reading and dialogue* have tremendous power and value)
"Reflect and Connect"

“We don’t *learn* from experience, we learn by *reflecting* on it.”

-- John Dewey

- What was the **most valuable** idea that *you learned* from this morning?

- Please write down 2 “*I will statements*”: How will you **use** the information shared today, when you return to your school or school district?
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