How People Learn

Instructions:

Form groups of 4
Sign the group worksheet
Take a baggie. Write your name on popsicle stick in the baggie.
Analysis of Schooling
Analysis of Schooling

Select a math or science course you have taken.

What are two key things you will remember about this course 5 years from now?
What are some problems facing the world/nation that you are concerned about?
Where does the mass of a tree come from?

a. Water
b. Nutrients in the ground
c. Air
d. Sunlight
Key Concept

• Matter (Carbon atoms) can change form

CO₂ gas --&gt; C in tree
Key Concept

• Matter (Carbon atoms) can change form

  \[ \text{CO}_2 \text{ gas} \rightarrow \text{C in tree} \]

• Once idea understood, can transfer it to other situations.
  
  - \( \rightarrow \) tree falls to ground, covered up
  
  - \( \rightarrow \) Carbon in coal
  
  - \( \rightarrow \) Coal burns
  
  - \( \rightarrow \) \text{CO}_2 \text{ in the air}
Key Concept

- Matter (Carbon atoms) can change form
  
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Global Warming!
Educational Implications:

Mile wide – inch deep approach to curriculum
“Need to cover the material”

Cover less but in more depth so students can learn the key ideas. Can then transfer to new situations.

HPL 3. Meta-Cognition: Thinking about one’s thinking

Group Assignment:
Make a list of the teaching techniques I used in the lesson.
What was the purpose of the technique?
Which of these techniques gave you the opportunity to reflect on your thinking?
Formative Assessment:

(i) Assessing what students know and using this information to guide instruction (teacher)

(ii) Assessing what one knows and using this information to guide studying (student).
Formative Assessment:

(i) Assessing what students know and using this information to guide instruction (teacher)

(ii) Assessing what one knows and using this information to guide studying (student).

Which teaching techniques provided opportunity for the teacher to get feedback on student learning/understanding?
How People Learn: 
Brain, Mind, Experience, and School

National Academy of Science
Washington, D.C.
The New Science of Learning

Principal 0: To learn, people need to be interested and motivated.
The New Science of Learning

Principal 0: To learn, people need to be interested and motivated.

Principal 1: Pre-existing knowledge and misconceptions
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Principal 0: To learn, people need to be interested and motivated.

Principal 1: Pre-existing knowledge and misconceptions

Principal 2: Key Concepts
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Principal 0: To learn, people need to be interested and motivated.

Principal 1: Pre-existing knowledge and misconceptions

Principal 2: Key Concepts

Principal 3: Self-reflection on learning / Meta-cognition
### The New Science of Learning

#### Three Fundamental Principals of Learning

<table>
<thead>
<tr>
<th>Key Findings</th>
<th>Implications for Teaching</th>
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</thead>
<tbody>
<tr>
<td>1. Students come to the classroom with preconceptions about how the world works. New understandings are constructed on a foundation of existing understandings and experiences. If their initial understanding is not engaged, students may fail to grasp the new concepts and information that are taught, or they may learn for purposes of a test but revert back to their preconceptions outside the classroom.</td>
<td>1. Teachers must draw out and work with the preexisting understandings that their students bring with them including misconceptions.</td>
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### The New Science of Learning
Three Fundamental Principals of Learning

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<td>2. To develop competence in an area of inquiry, students must (a) have a</td>
<td>2. Teachers must teach subject matter in depth, providing many examples in which the</td>
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<tr>
<td>deep foundation of factual knowledge, (b) understand facts and ideas in the</td>
<td>same concept is at work and providing a firm foundation of factual knowledge. Teachers</td>
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<td>context of a conceptual framework, and (c) organize knowledge in ways that</td>
<td>should help students organize their knowledge into a coherent structure using key concepts.</td>
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<td>facilitate retrieval and application.</td>
<td></td>
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<td>3. A “metacognitive” approach to instruction can help students learn to take control of their own learning by defining learning goals and monitoring their progress in achieving them. ‘</td>
<td>3. The teaching of metacognitive skills should be integrated into the curriculum in a variety of subject areas.</td>
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