

How People Learn

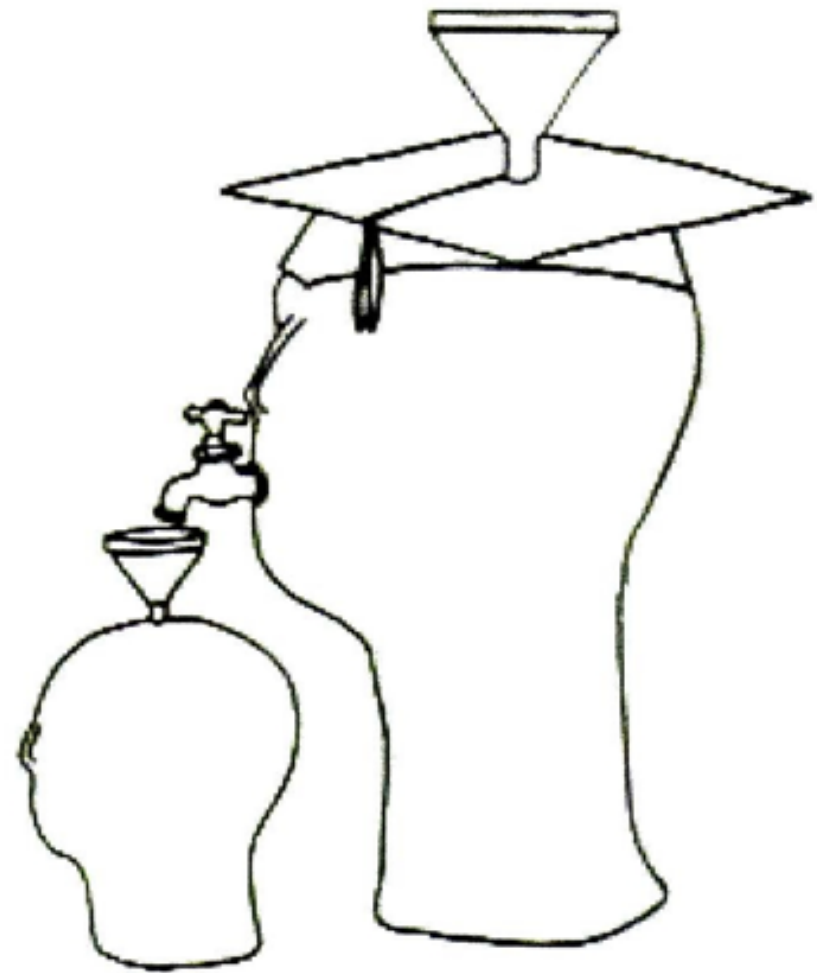
Tamara Brenner and Rosa Veguilla



Learning objectives

By the end of this session, you will be able to...

1. Apply an understanding of how students learn to the development of instructional activities
2. Help students develop strategies to improve their studying and learning





Transmissionist

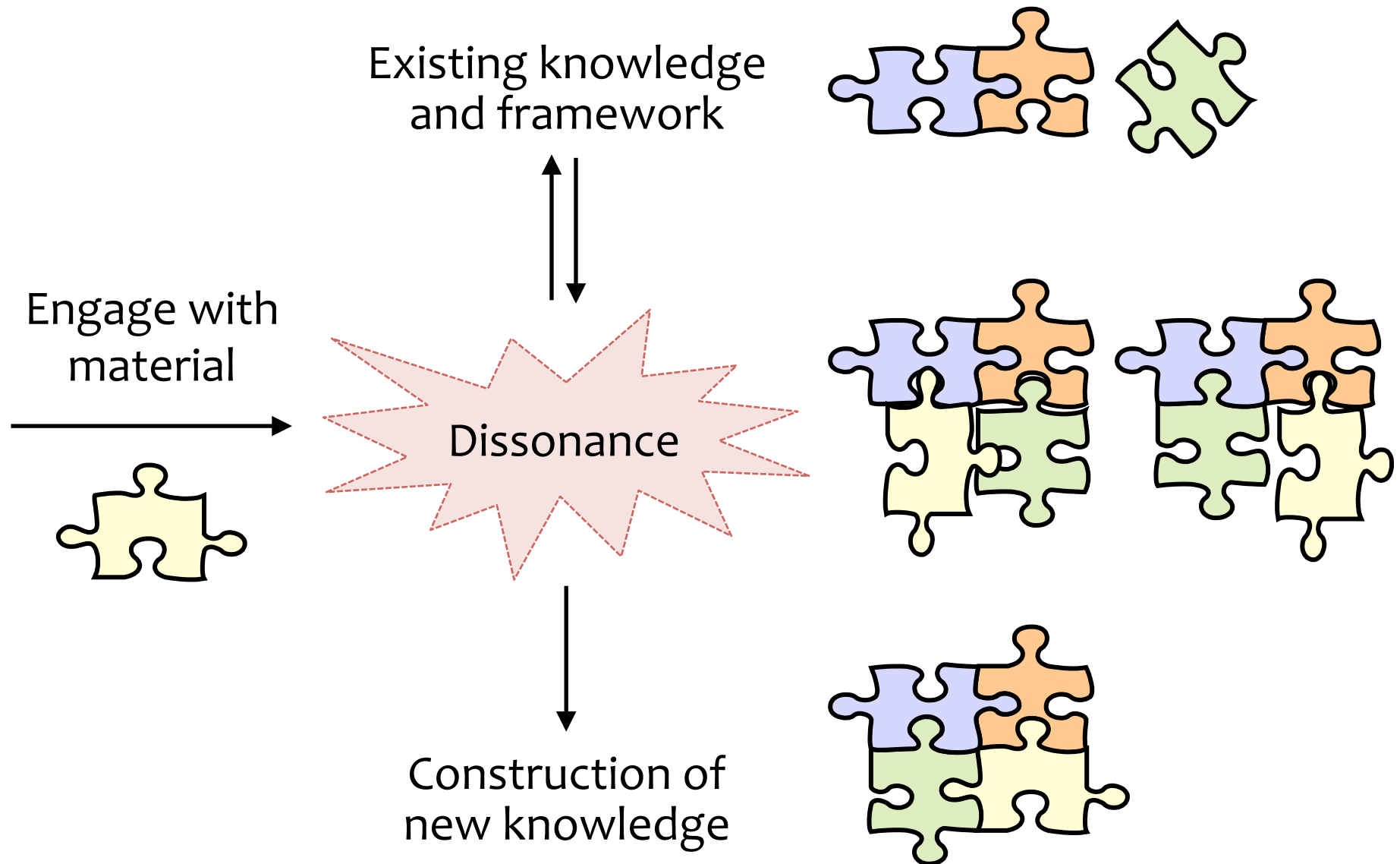
Lecturer: I know a lot about this topic, so I will transmit my knowledge to you by telling you about it.

Constructivist

Facilitator: I know a lot about this topic, so I will create situations and present challenges for you so that you construct your own knowledge and understanding.

Compelling evidence supports the constructivist view of how learning works.

How people learn



Principle 1

Recalling information leads to remembering

Activity: 2 minutes

In the last session, we discussed resources that might be helpful to students in need.

Write down as many resources as you can remember.

A study about memory

Study (S) = Read a passage about a science topic

Test (T) = Write down everything you remember

					5 min		1-week
Group 1	S	S	S	S	Test	-----	Test
Group 2	S	S	S	T	Test	-----	Test
Group 3	S	T	T	T	Test	-----	Test

A study about memory

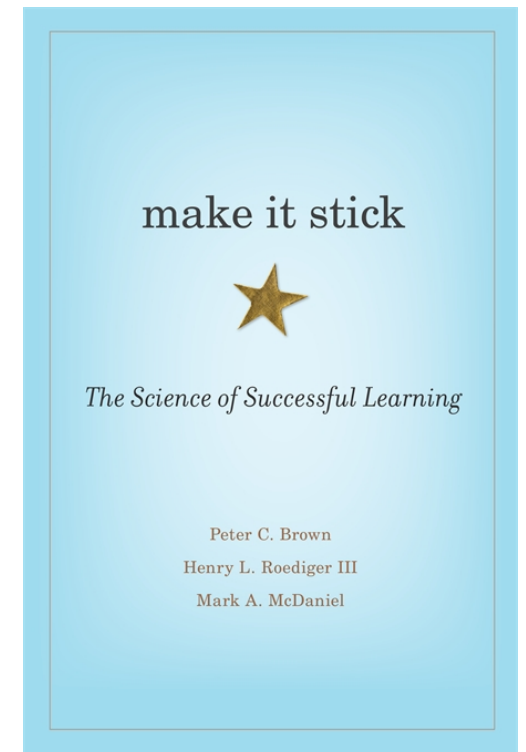
Condition	Retention Interval	
	5 min	1 week
SSSS	.83	.40
SSST	.78	.56
STTT	.71	.61

Re-study or re-reading creates

“Illusions of knowing”

Testing enhances learning

“Testing Effect”



Principle 1: recalling information leads to remembering

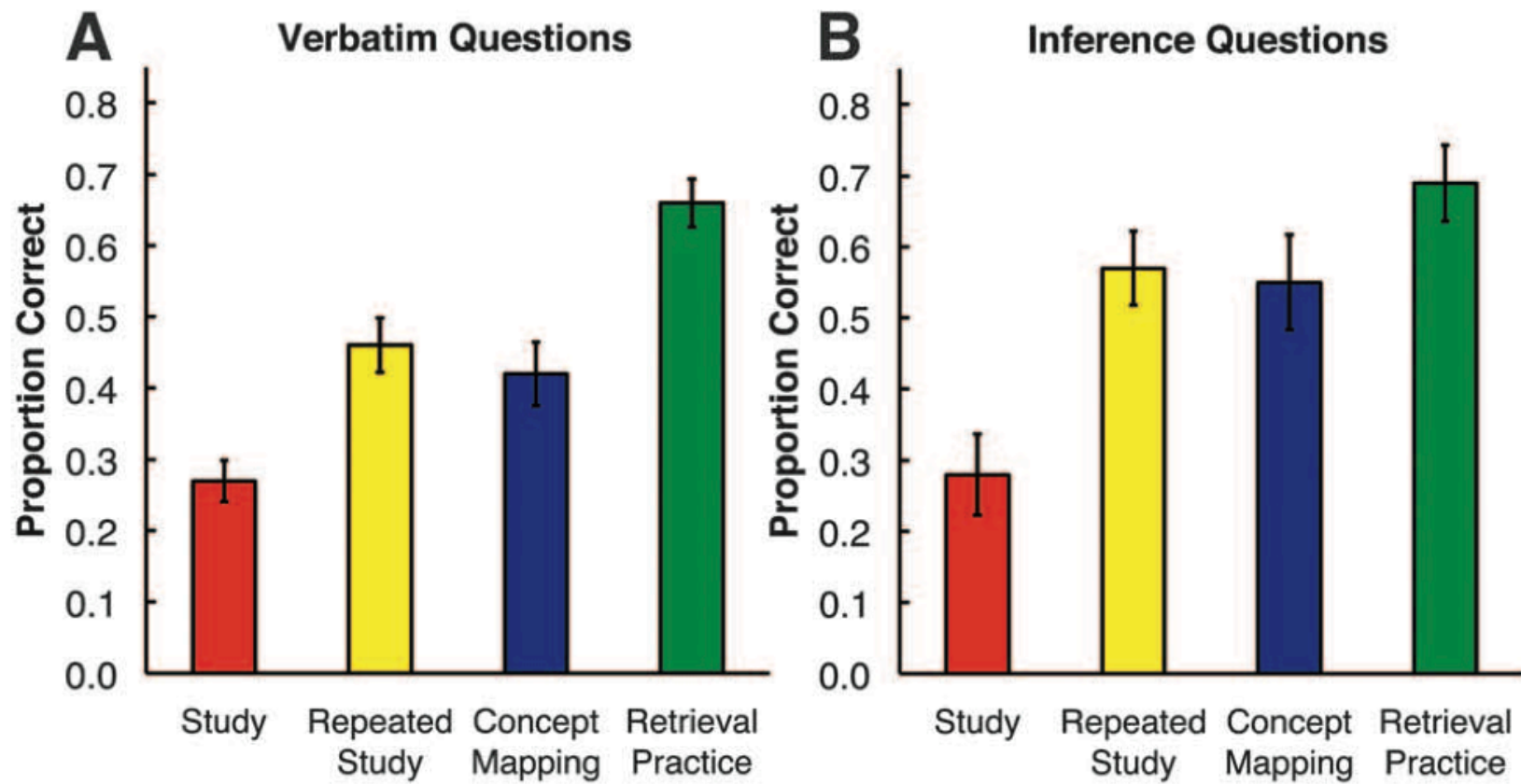
How can you apply this as a TF?

Suggestions from workshop:

- Ask students to recall knowledge at beginning of section
 - Give a short quiz; Recall key ideas on blank paper
- Last 5 minutes of section – ask student to write everything they remember
- Ask students to summarize each lecture in two sentences
- Study advice:
 - Advise students to take practice tests under exam-like conditions
 - Suggest that students spend ten minutes with a blank piece of paper after lecture to write down what they remember

Principle 2

Encountering the same idea multiple times leads to remembering



Principle 3

How students organize knowledge influences how they learn and apply what they know

Build BOTH

Factual
knowledge



Conceptual
framework

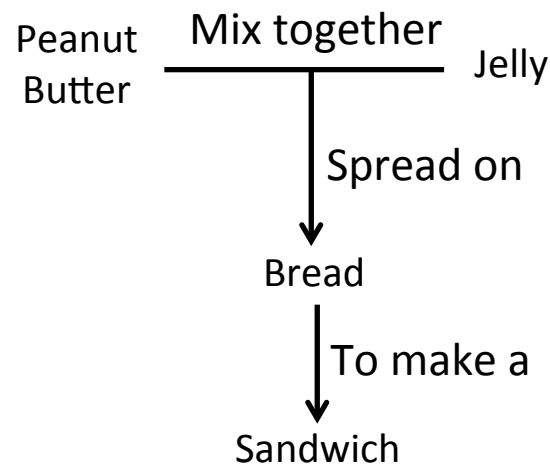


Activity: Concept map

Make a concept map with the following terms:

DNA, RNA, replication, promoter, transcription, amino acid, translation, stop codon, start codon, dNTPs, DNA polymerase, tRNA, protein

Example:

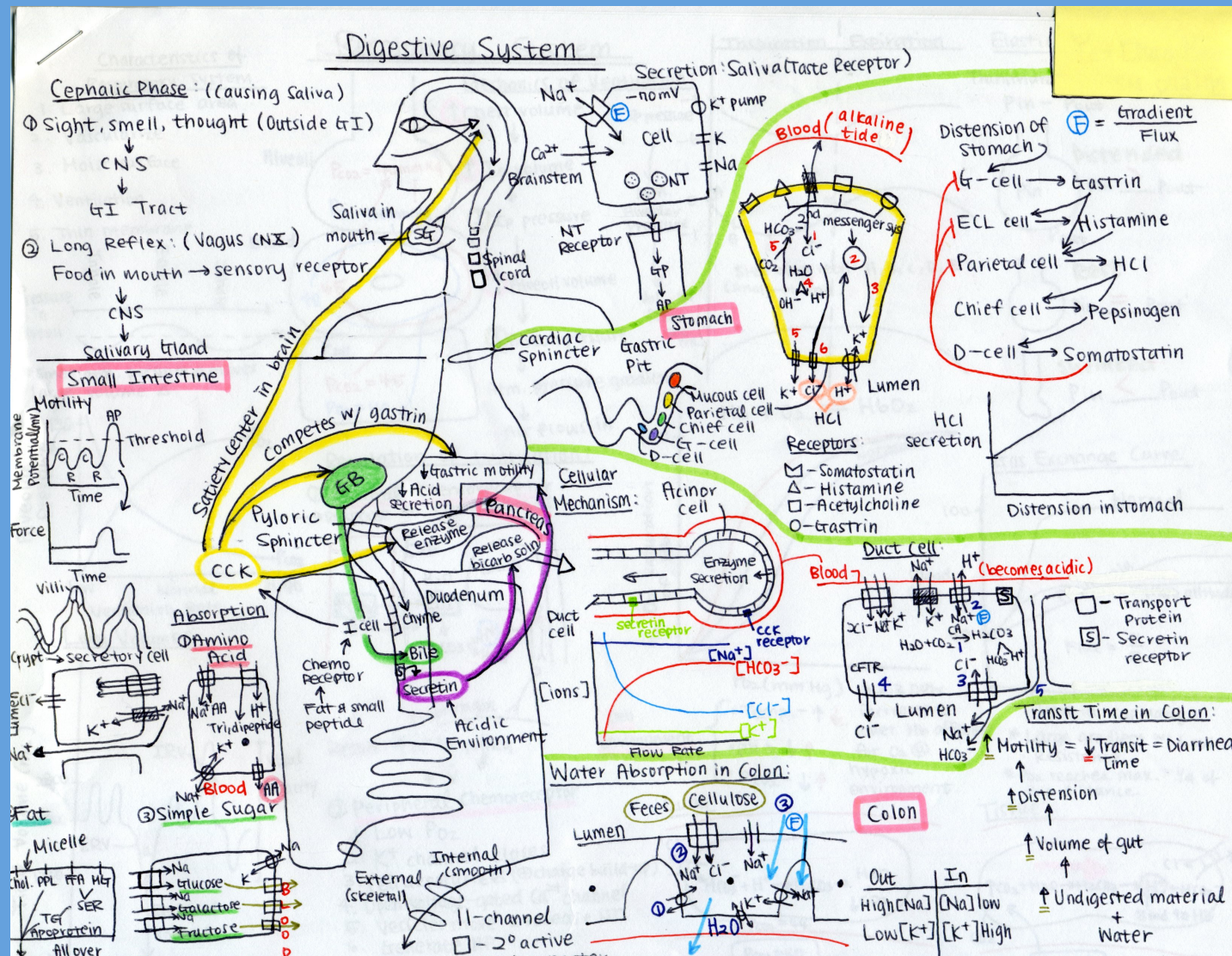


Other ways that a TF can help students organize their knowledge:

Suggestions from the workshop:

- Have students generate learning objectives
- Compare and contrast
- Give complex problems that require application
- Mneumonics
- Grouping by categories
- Application to real life

Example of a summary sheet



Principle 4

**To become effective learners, students must learn to
monitor their own understanding**

Brainstorm Activity

How do you know when you know something?

Ideas from workshop:

- When you can teach someone
- When you can explain in different ways
- When you can ask sophisticated questions
- When you can simplify complex ideas

As they study, students need to think about:

- What is the goal?
- What is their strategy for getting there?
- How well did their strategy work?



Helping students develop strategies for monitoring their own learning

- **Provide Learning Objectives/Goals:** Keep students focused
- **Pose questions:** Posing questions before, during and after reading or instruction will help students to focus on the key points they should be learning.
- **Give self-monitoring strategies:** Give students strategies for being aware of their own learning
 - End of lecture reflection
 - Problem Sets
 - Practice Exams
 - Small group work
 - Teaching each other
 - Peer review/reader response
 - Exam wrappers



Exam Wrappers

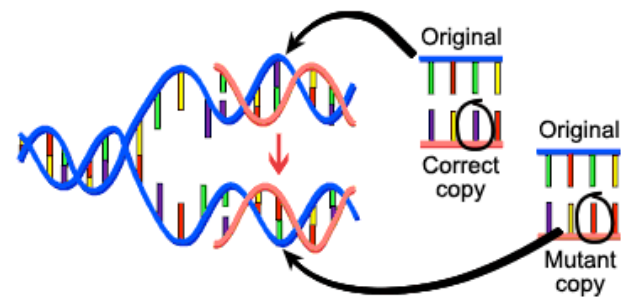
- What strategies did you take to study for this test?
- What types of errors did you make on this test?
- What are you going to do differently to prepare for the next test?

Principle 5

What causes the seasons?



Give one example of why undergraduates should care about mutations.



Imagine that you are teaching freshmen with little background in science.

What is one idea that you would like to teach them about stem cells?

Principle 5

**Introducing wait-time allows more students to think,
learn, and be included in the classroom**

Summary

- Principle 1: Recalling information leads to remembering
- Principle 2: Encountering the same idea multiple times leads to remembering
- Principle 3: How students organize knowledge influences how they learn and apply what they know
- Principle 4: To become effective learners, students must learn to monitor their own understanding
- Principle 5: Introducing wait-time allows more students to think, learn, and be included in the classroom