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1. Learners must be clear about the learning intentions and criteria for success in the STEM classroom.
2. Learners need opportunities to recall, reorganize, and make meaning of STEM learning.
3. Learners need to engage in an appropriate pace of instruction, based on their level of readiness.
4. A teacher's fundamental task is to use formative assessment that evaluates the effect of the learning experience on students' learning and achievement in STEM.

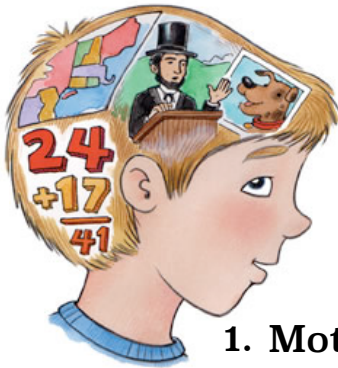
Behavioral Engagement

Emotional Engagement

Cognitive Engagement

Imagine if you were simply asked to get in your car and drive; at some unspecified time, I will let you know when you have successfully arrived. For too many students, this is what learning feels like.
Hattie, 2012, p. 50





Establishing Relevancy and Motivation

1. Motivating students to engage in learning requires the students to perceive a **kno**_____ **g**_____.
2. The ability to close this **kno**_____ **g**_____ must be perceived as realistic and doable, with **scaf**_____.
3. Teachers help students perceive these **kno**_____ **g**_____ by explicitly identifying the **int**_____ of the lesson and showing them what **su**_____ looks like at the end.

Strategies



**Illusion of
Explanatory Depth**

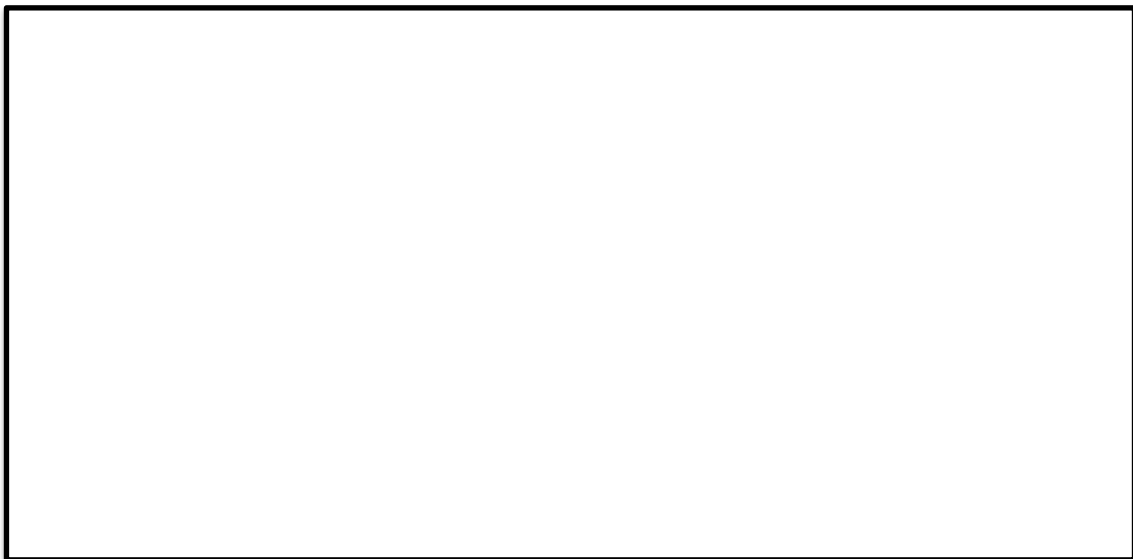


Illusion of Competence



Interleaving Practice

Strategies



Monitoring the Pace of Instruction



The students don't have the
w_____
m_____ to store new
con_____.

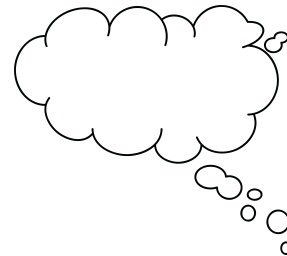
Students have limited
phys_____ re_____
(gl_____, ace_____, etc.)
to make new
me_____.

The student brain doesn't
have the space in the
hi_____ to make even
a tem_____ memory.



**Focused
Thinking**

**Diffuse
Thinking**



Make Student Thinking Visible...

1. Ask students to **ob**_____ and **de**_____ what they “see”.
2. Build **ex**_____ and **int**_____.
3. **Re**_____ with **ev**_____.
4. Make **co**_____.
5. Consider different **v**_____ and **pe**_____.
6. Capture the **big i**_____ and **form** **co**_____.
7. Promote inquiry or the **a**_____ of **more** **q**_____.
8. Uncover the **co**_____ by going **below** **the s**_____.



Ritchhart, Church, and Morrison, 2011

Strategies

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