Metacognition in the Learning Environment

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What is Metacognition?

- knowledge of one's own thinking processes and strategies, and the ability to consciously reflect and act on this knowledge of cognition
- what we know about what we know
  - thinking about thinking
  - “when was the last time you thought about your 6th birthday?”
Before we begin.....
The Goosegirl

There was once an old Queen whose husband had been dead for many years, and she had a very beautiful daughter. When she grew up she was betrothed to a Prince in a distant country. When the time came for the maiden to be sent into this distant country to be married, the old Queen packed up quantities of clothes and jewels, gold and silver, cups and ornaments, and, in fact, everything suitable to a royal outfit, for she loved her daughter very dearly.
Metacognition in the Classroom Seems to be Growing, and for All Ages

link to the metacognition song video: https://www.youtube.com/watch?v=FvyZsSQ3ul4

We’ve got metacognition Running through our minds We’ve got metacognition And it isn’t hard to find Can’t you hear your thoughts A calling? Listen to my song We’ve got metacognition Learning all day long.
Metacognition in the Classroom Seems to be Growing, and for All Ages
Judgments of Learning (JOLs)

can we accurately determine amount of time/resources we must invest to learn material?

do you know when you should move on to new material?

do you know when you need to spend more time on the material?

study: popsicle
JOL: How likely is it that you will recall this item on a later test?

recall: ????
Judgments of Learning (JOLs) results on accuracy of JOLs are mixed...depends on immediate vs. delayed

- **study**: popsicle
  - **JOL**: How likely is it that you will recall this item on a later test?
  - **recall**: ????

- **study**: strawberry – popsicle
  - 5 min delay
  - **JOL**: How likely is it that you will recall this item on a later test?
  - **recall**: strawberry – ????
JOLs and Exams

Study → While Reading → Quiz Yourself

Study → Break → Quiz Yourself
1. When learning material, take breaks and then quiz yourself on what you were studying before the break.

- if you are successful, move on to new material
- if you are not successful, spend more time on those concepts
Metacognitive Strategies

Effective Learning is...

- active
- effortful
Effective Learning is...
Metacognitive Strategies

2. Use activities/demos as a structure (i.e., retrieval cues) when trying to remember the material.

- may be particularly useful for students who have some test/assessment anxiety
Example: Learning about processing...

Once you see the dalmation, it's hard not to see it.
Example: Learning about processing...

Vokey & Read (1985): Subliminal messages demonstration

music passage:
Vokey & Read (1985): Subliminal messages demonstration

Results:
- 83.1% of participants hear the messages
- but, only 1.5% of them hear the message BEFORE being told what to listen for

Conclusions
- hearing messages in backward music/speech due to active construction (top-down processing)
- does not mean you will just hear anything though (bottom-up processing)
Effective Learning is...

active

What students want, vs. what they need for effective learning, does not always match up....
Metacognitive Strategies

3. Try to look “behind the curtain” and understand the learning process
   - e.g., some techniques may be viewed by students as “punishment”, when really they are meant for effective learning
If the balloons popped, the sound wouldn’t be able to carry since everything would be too far away from the correct floor. A closed window would also prevent the sound from carrying, since most buildings tend to be well insulated. Since the whole operation depends on the steady flow of electricity, a break in the middle of the wire would also cause problems. Of course, the fellow could shout, but the human voice is not loud enough to carry that far. An additional problem is that the string could break on the instrument. Then there would be no accompaniment to the message. It is clear that the best situation would involve less distance. Then there would be fewer potential problems. With face to face contact, the least number of things could go wrong.
Example: The Importance of Organization...

If the balloons popped, the sound wouldn't be able to carry since everything would be too far away from the correct floor. A closed window would also prevent the sound from carrying, since most buildings tend to be well insulated. Since the whole operation depends on the steady flow of electricity, a break in the middle of the wire would also cause problems. Of course, the fellow could shout, but the human voice is not loud enough to carry that far. An additional problem is that the string could break on the instrument. Then there would be no accompaniment to the message. It is clear that the best situation would involve less distance. Then there would be fewer potential problems. With face to face contact, the least number of things could go wrong.

Participants who had both the passage AND the picture remembered twice as much as the participants who only had the passage. (Bransford & Johnson, 1972)

So, one of the reasons I do not hand out a full copy of the lecture notes is organization. I give you a “stripped down” version so that you add your own organization to the info.
4. Focus and reflect on how the to-be-learned material will need to be used in the future.
Metacognitive Strategies

4. Focus and reflect on how the to-be-learned material will need to be used in the future

Is the exam multiple-choice (M/C) questions or essay questions?

If M/C questions..... just reading the material may be okay
If essay questions..... need to focus on comprehension, not just reading
4. Focus and reflect on how the to-be-learned material will need to be used in the future

| elaborative rehearsal/ deep processing | vs. | maintenance rehearsal/ shallow processing |
Levels of processing (LOP) theory: memory depends on how information is encoded, with better memory being achieved when processing is deep than shallow.

popsicle

Is the word something you would want on a deserted island?

Does the word contain the letter ‘a’?

deep  >  shallow
Metacognitive Strategies

4. Focus and reflect on how the to-be-learned material will need to be used in the future

elaborative rehearsal/
depth processing vs. maintenance rehearsal/
shallow processing

- reading textbook, linking concepts, thinking of examples, etc.
- effective for applying material to novel situations, conceptual questions, etc.
- reading textbook, try to memorize as much info as possible, etc.
- effective for one-to-one application (e.g., M/C questions)
Time to quiz ourselves... think back to the Goosegirl story you saw at the start of this session.
Q1. Which of the following words appeared in the story “The Goosegirl”?

a) puppet
b) prince ✓
c) peach
d) poppy
Q2. Explain why the Queen in “The Goosegirl” story packed up clothes, jewels, gold, silver, cups, etc.
The Goosegirl

THERE was once an old Queen whose husband had been dead for many years, and she had a very beautiful daughter. When she grew up she was betrothed to a Prince in a distant country. When the time came for the maiden to be sent into this distant country to be married, the old Queen packed up quantities of clothes and jewels, gold and silver, cups and ornaments, and, in fact, everything suitable to a royal outfit, for she loved her daughter very dearly.

How the story may look to a student with dyslexia who disorients while reading (i.e., drops words that don't form mental images)
Individual Differences

Some learners will need more direction or guidance to use metacognition for effective learning.

The Goosegirl

Once upon a time, there was a very old Queen whose husband had been dead for many years, and she had a very beautiful daughter. When she grew up, she was betrothed to a Prince in a distant country. When the time came for the maiden to be sent to this distant country to be married, the old Queen packed quantities of clothes and jewels, gold, silver, cups and ornaments, and in fact, everything suitable for a royal outfit, for she loved her daughter dearly.

Student expands a lot of time, effort, and energy just trying to engage with and read the text. May misinterpret all the effort for reading as comprehension of the story.