

Self-Awareness

Lesson Title: Mnemonics Teach One

Grade Level: High School

Project and Purpose

Students analyze an article about mnemonics and create 3-5 original mnemonics.

Essential Question

How do mnemonics and teaching help us remember and learn information?

Materials

- Copies of the article “Mnemonics: Making the Forgettable Memorable” by Joe Kirby
- Article analysis sheet
- Mnemonics examples
- Paper/pens or computer writing program

Teacher

Note: This lesson will take more than one classroom session.

1. Tell students that research tells us that there are two particularly good ways to help our brains remember and learn: mnemonics and teaching others. Explain that in this session, they will create mnemonics to teach.
2. Ask the class if they have ever used mnemonics in their school experiences. If helpful, use the Mnemonics Examples slide/handout to support their memories. Encourage them to think of how their teachers have used mnemonics help them learn information and/or processes in other subjects, how their coaches used mnemonics to help them remember plays, how their directors used mnemonics to help them remember their lines or their lyrics, etc.
3. Ask them to think of some things they have learned this year that require a lot of memorization and collect a list on the board. These can be from any area of their lives: school, arts, teams, work, community organizations, etc. Call this list “Things Learned” and tell them this list will be the fodder for their project.
4. Have the students vote on four to six topics from the “Things Learned” list created in step #3. Assign one of the “Things Learned” to a different space in the room and have students select the group they wish to work with. *Alternatively, teachers can determine how to organize students into working groups.*
5. Distribute the article “Mnemonics: Making the Forgettable Memorable” by Joe Kirby and tell students they will use the article to guide their creation of mnemonics. (Note: A worksheet is provided to help structure their analysis of the article, should your students need it.)
6. After they have read and discussed the article, tell groups they will create an original mnemonic to help them teach the other class groups how to remember their “Thing.” Encourage them to use the “Four Principles of Creating Mnemonics” from the article to guide their planning.

7. Each group must create:
 - The purpose for needing to remember this information
 - An original mnemonic
 - A visual representation of the mnemonic (this can take any form you wish: a poster, a digital poster or slide, a human tableau—student choice)
 - A presentation for the large group
8. Give them the rest of the class to create and plan. Teachers should determine the amount of time groups will have to plan their presentation and set the date and order of presentations.
9. On presentation day, remind the large group of appropriate “audience” behavior.

Conclusion

When all groups have presented, close with a discussion: How do mnemonics and teaching help us remember and learn information?

Notes

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

Mnemonic Examples

To remember spelling rules:

"I" before "E"

Except after "C",

And when sounded like "A"

As in "neighbor" and "weigh."

The principal is your *pal*. (To help us remember spelling.)

To remember order:

My Very Energetic Mother Just Served Nice Plums

(Order of planets in distance from the sun: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Neptune, Pluto)

To remember long division steps:

Does **M**cdonald's **s**ell **b**urgers? **D**ivide, **m**ultiply, **s**ubtract, **b**ring down

A HANDS-ON way to remember the five kinds of salmon:

- The thumb is CHUM (rhyme)
- The pointer finger can POKE your eye out (image, feeling)
- The tall finger is KING (image)
- The ring finger is SILVER (just like the ring on a finger) (image)
- The pinkie stands for PINK (word clue)

Notes

Mnemonics: Making the Forgettable Memorable

Posted on December 17, 2016 by Joe Kirby

I've always loved mnemonics. One of the first ones I learned was for the points of the compass, clockwise: ***Naughty Elephants Squirt Water***. Why does it work so well to help young children remember? I think it's because it's **simple**, not overloading, but rather chunking four pieces of information into one unit of meaning, a meaningful sentence, which is also a **vivid**, memorable mental image; it is also **sequential**, with the order of letters and words reflecting the order of compass points, helping us remember the difference between **East** and **West**, which are often and easily confused by children.

A demo

I saw my colleague teaching a lesson on psychology recently. She shared a demonstration on memory. Try this simplified version of it. *There are three buckets of words to remember. Take 60 seconds to try to revise each one, ready to reproduce them within 60 seconds:*

- **Bucket 1:** tree market happiness box window apple love road book hat
- **Bucket 2:** fox hen burger steak love conflict bed pillow computer phone
- **Bucket 3:** arrow ball crow dice effort fall gate hero injustice jumper

Which buckets were easier to remember? Once we see the **pattern** of bucket 2, pairs, or the **pattern** of bucket 3, alphabetical order, these give us ways to recall remembered information: **cues**. The reasons that bucket 2 is easier than bucket 1 is because of **organization**, and that bucket 3 tends to be easiest is because of unique cues (first letters sequenced in alphabetical order).

What we can learn from this demo is that if we want our pupils to remember what they're learning, it might be advantageous if we can **organize** subject material and give them distinctive **cues** for recall.

Acrostic Mnemonics

Some of my favorite type of mnemonics are acrostic mnemonics. ***Naughty Elephants Squirt Water*** is just one example. Here are 20 or more others that are useful for learning subjects, some of which I still remember being taught in school to this day, for remembering tricky subject knowledge:

1. Living Organisms

Mrs. Gren: move, respire, sense, grow, reproduce, excrete and require nutrition.

2. Trigonometry

SohCahToa: sine opposite hypotenuse; cosine adjacent hypotenuse; tan opposite adjacent

3. Mathematical order of operations

BIDMAS: brackets indices division multiplication addition subtraction

4. Long Division in Mathematics

Does McDonalds sell burgers? Divide, multiply, subtract, bring down (via Philip Roddy)

5. Seven continents

Always Eat An Apple, Says Aunt Nora: Asia Europe Africa Australasia South America Antarctica
North America

6. Order of Planets

My Very Easy Method Just Speeds Up Naming Planets: Mercury Venus Earth Mars Jupiter Saturn
Uranus Neptune Pluto

7. **Colours of a Rainbow**
Richard of York Gave Battle in Vain: Red Orange Yellow Green Blue Indigo Violet
8. **Scientific Classification**
King Phillip Can Order Five Good Soups: Kingdom Phylla Class Order Family Genus Species
9. **Five Kinds of Vertebrates**
FARM B: Fish, Amphibians, Reptiles, Mammals, Birds
10. **Scientific Conversion**
Oil Rig: oxidation is losing electrons, reduction is gaining electrons
11. **Natural Selection in Biology**
VC Baspog: variation, competition, best adapted survive, pass on genes (via Damian Benney)
12. **Coordinating Conjunctions in Grammar**
Fanboys: for and nor but or yet so
13. **Order of Greek Philosophers**
Spa: Socrates Plato Aristotle
14. **Five Pillars of Islam**
French People Can't Forget Paris: Fasting Prayer Charity Faith Pilgrimage
15. **Five Prophets**
I just love every day: Isaiah Jeremiah Lamentations Ezekiel Daniel
16. **First Five Old Testament Books**
God's Eternal Love Never Dies: Genesis Exodus Leviticus Numbers Deuteronomy
17. **Musical Notation**
Every Girl Born Deserves Freedom: EGBDF keys
18. **French past tense verbs conjugated with etre not avoir**
Dr Mrs Vandertramp: devenir, revenir, monter, rester, sortir, venir, aller, naitre, descendre, enter, rentrer, tomber, retourner, arriver, mourir, partir
19. **Tricky Spellings**
Beautiful: big elephants are under trees in forests until light
Rhythm: rhythm helps your two hips move
Mnemonics: Mnemonics Now Erase Mankind's Oldest Nemesis, Insufficient Cerebral Storage!
20. **Psychology: Four Lobes of the Brain**
Freud Tells Parents Off: Frontal, Temporal, Parietal, Occipital. (via Kate Barry)
21. **Medicine: Twelve Cranial Nerves**
On Old Olympus' Towering Tops, A Finn And German Viewed Some Hops: optic, olfactory, oculomotor, trochlear, trigeminal, abducens, facial, auditory, glossopharyngeal, vagus, spinal accessory, and hypoglossal nerves.
22. **Historical Dates: Rhyme Mnemonics**
There are also rhyme mnemonics for historical dates, such as: **In 1492, Columbus sailed the oceans blue.**

What can we learn from these 20+ mnemonics? How exactly do they help us remember? They are simple; they chunk down complex, overloading or forgettable knowledge and they make it memorable, cheating the limitations of our working memories; they give us a way of self-checking that we have remembered all the content, and in the right order.

In almost every area of human knowledge, mnemonics are useful – from mathematics, science, geography, music, religion, history, literature, philosophy and languages, including complex processes like trigonometry, to spelling, grammar, and medicine, as the examples above show – because they work with the human cognitive architecture that we all have in common.

So, if we want to make our own mnemonics useful for our own subjects, here are some ways we could start.

Four Principals for Memorable Mnemonics

- 1. Selection:** Select knowledge that lends itself to be turned into a mnemonic.
For example, **serial** information (like planets in order of proximity to the sun) especially lends itself to acronym mnemonics; so does **numbered** information (five pillars, seven continents, twelve nerves, etc).
- 2. Cue:** Use the **first letters** as the 'raw material' for cues.
- 3. Chunk:** Create a vivid, memorable **phrase** that reduces the content to a single chunk.
- 4. Rehearse:** Practice **converting** the mnemoniic to the content and the content to the mnemonic.

Example of Making a New Mnemonic: Seven Deadly Sins

Here is an example of a mnemonic we have created in our English department. We were trying to come up with ways for our pupils to remember what all the **7 deadly sins** from Medieval England were. The number is just beyond the limits of working memory, so both children and teachers were finding it hard to remember all seven reliably. I came up with the faintly ludicrous mnemonic **GP WEASL** (Gluttony Pride Wrath Envy Avarice Sloth Lust): imagine an eccentric Austrian doctor, perhaps! My colleague Sarah went one better and came up with a more easily memorable image:

Wasp Leg: Wrath Avarice Sloth Pride; Lust Envy Gluttony.

We really liked it because it's a vivid image, chunked into one meaningful phrase. It has helped both teachers and pupils to recall what the 7 deadly sins are, which is useful when reading Chaucer's *Canterbury Tales*, the morality plays like *Everyman* and much subsequent English literature.

Another simple one we came up with in science was a way to remember the answer to the question: why wasn't Darwin's theory of evolution by natural selection accepted after the 1859 publication of 'On The Origin Of Species'?

GEM: God (19th century Victorians believed in divine, biblical creation); Evidence (there was insufficient evidence through fossils); Mechanism (genetics as a science didn't yet exist).

I'm an English teacher, and so from here on I'm going to stick to English examples. But you could apply this process for making mnemonics to any subject.

Spelling Mnemonics

In English, two of the areas that mnemonics hold most potential in are **spellings** and **quotations**. Spellings in English are often irregular and tricky to remember.

How to remember that **responsible** (unlike **accountable**) ends with **-ible** not **-able**? Words like appear, necessary, tomorrow, repetition and successful have tricky, forgettable combinations. I still have to write rhyme slowly in case I misspell it and confuse it with rhythm! Here are 10 mnemonics that help kids remember how to spell 10 frequently misspelled words:

1. fascinating: science is fasciinating
2. repetition: repeated letters are **E-T-I** in rE-p-E-T-I-T-I-on.
3. suspense: suspense has 3 's' letters, like the dot dot dot of a cliffhanger...
4. responsible: I am responslble for my fate.
5. rhyme: rhyme helps your mate educate.
6. appear: Peter Pan appears, then disappears.
7. necessary: it's necessary for a shirt to have 1 collar, 2 sleeves: 1 c, then 2 s's
8. tomorrow: will we go with **Tom or Row** tomorrow?
9. successful: Cheryl Cole and Steven Spielberg are both successful.
10. embarrassing: It's embarrassing when we blush ruby red and feel like an ass.

What these mnemonics have in common is encoding a memorable way to remember the trickiest part of difficult spellings. Building up a bank of spelling mnemonics and teaching them explicitly is something we are embarking on at [our school].

Quotation Mnemonics

We also want to prepare our pupils for GCSE literature exams and English essays where the questions are unseen before the assessment. They need to know many quotations off by heart in order to succeed. Mnemonics are a great way of remembering trigger words for quotations. For instance, we want pupils (and teachers!) to remember these quotations from Shakespeare's play Macbeth, starting with the main character.

1. "Stars, hide your fires; let not light see my black and deep desires."
2. "He's here in double trust; first, as I am his kinsman and his subject, strong both against the deed."
3. "Vaulting ambition only overleaps itself."
4. "Is this a dagger which I see before me, the handle toward my hand?"
5. "Hear it not, Duncan; for it is a knell that summons you to heaven or to hell."
6. "A voice cried 'sleep no more! Macbeth does murder sleep!'"
7. "Will all great Neptune's ocean wash this blood clean from my hand?"
8. "I am in blood stepped in so far that, should I wade no more, returning were as tedious as go over."
9. "Out, out, brief candle! Life's but a walking shadow
10. "I bear a charmed life, which will not yield to one of woman born."

An approach we've found successful is to choose a striking '**trigger word**' that can be remembered in order of the plot of the play. For instance:

1. "**Stars**, hide your fires; let not light see my black and deep desires."
2. "He's here in double **trust**; first, as I am his kinsman and his subject, strong both against the deed."
3. "Vaulting **ambition** only overleaps itself."
4. "Is this a **dagger** which I see before me, the handle toward my hand?"
5. "**Hear** it not, Duncan; for it is a knell that summons you to heaven or to hell."
6. "A voice cried '**sleep** no more! Macbeth does murder sleep!'"
7. "Will all great **Neptune's** ocean wash this blood clean from my hand?"
8. "I am in **blood** stepped in so far that, should I wade no more, returning were as tedious as go over."
9. "Out, out, brief **candle**! Life's but a walking shadow
10. "I bear a **charmed** life, which will not yield to one of woman born."

10 Trigger Cues for Macbeth Quotations

Stars, trust, ambition, dagger, hear, sleep, neptune, blood, candle, charmed.

Ten words are easier to remember than ten quotations! It is then easy to set practice tasks such as: write out the 10 trigger words for your Macbeth quotations from memory, and pupils write: stars, trust, ambition, dagger, hear, sleep, neptune, blood, candle, charmed. We could go one step further and link them into a vivid phrase: "**Stars trust ambitious daggers, hearing sleepy nightmares of bloody candle charms.**" Ten quotations into one chunk in long-term memory. Practice exercises to recall the quotations using the mnemonic is then what is required for pupils to remember them during the essay. Some wrote 's t a d h s n b c c' in the margin of their essays to aid recall under time pressure, mid-flow!

Mnemonics are fantastically useful and versatile in teaching. Given what we know about how memory works, through encoding, storage and retrieval, and the interaction between limited working memory and almost unlimited long-term memory, the main limit to making mnemonics useful is our own imagination as teachers. For those who are interested, there is a sound foundation of over 60 years of scientific research into mnemonics:

- **Miller, 1956:** Limits on our capacity for processing information
"Recoding is an extremely powerful weapon for increasing the amount of information that we can deal with. In one form or another we use recoding constantly in our daily behavior."
- **Bellezza, 1996:** Mnemonic Methods to Enhance Storage and Retrieval
"The study of mnemonic devices can make important contributions to the study of human memory and learning. Teachers must learn how to activate appropriate information in the memories of their students by using specially designed mnemonics to develop useful knowledge structures. Current research provides reasons to be optimistic."
- **Levin, 2004:** Mnemonics boost recall
"In all experiments, mnemonic keyword students (whether individual, paired, or small group) outperformed their counterparts."
- **Worthen, 2010:** Mnemonology: Mnemonics for the 21st century
Encoding Processes are Fundamental to Mnemonic Success
"Research has established that the joint operation of organization and elaboration, herein referred to as distinctive processing, enhances memory retention beyond the operation of either alone."
- **Ornstein et al, 2010:** Teachers' Mnemonic Instruction and Children's Memory Skills
In longitudinal classroom research, researchers found that although memory demands in school are high, explicit instruction in specific strategies for remembering is low. Students taught by high mnemonic teachers outperformed those taught by low mnemonic teachers over one year and two year periods.

Article Analysis: “Mnemonics: making the forgettable memorable”

by Joe Kirby

Question	Response	Evidence
The author states three reasons why the first mnemonic example works. List the three reasons and explain the reasons in your own words.		
What is the purpose of the psychologist’s demo? Defend your answer.		
What is an acrostic mnemonic? Which of the examples will you or have you used? Why are acrostic mnemonics helpful?		
Explain how the author used the Four Principles of Creating Mnemonics to create working mnemonics for his English class.		
Choose one of the quotations from the final section on research. How does this quotation support using mnemonics? Why is it important that they are statements resulting from research?		