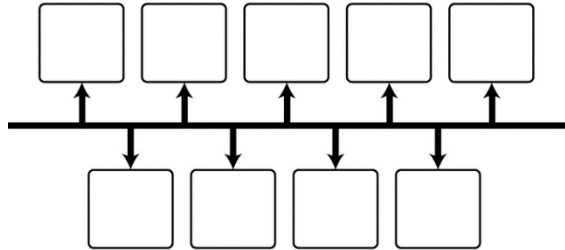


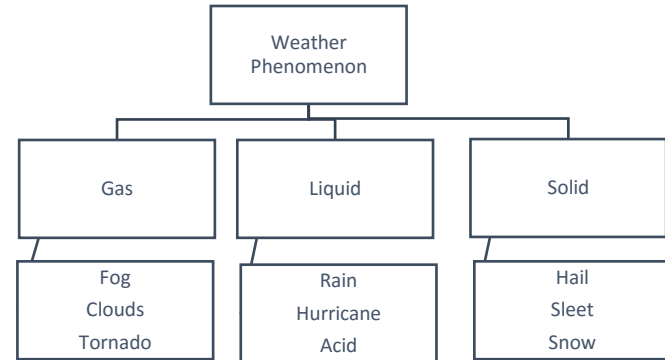
## Time Line

This technique utilizes visual representation to improve the processing of material. Begin with a horizontal line that represents the continuum of time. Important event are inserted relative to each other, creating points on the line. Each point that denotes an event should be marked with the date, a brief description of the event, and significant person(s) involved. Then define or give an example of terms where appropriate.



## Hierarchies

Forming Hierarchies is a method to organize information which utilizes different levels. The levels are based on whether a piece of information fits into a specific group, where higher level groups are much more inclusive and lower level groups are much more exclusive.



## Matrices

A matrix helps students organize information by showing its relationship to similar categories of information. It is a helpful tool for students to compare and contrast information. Students will need to develop categories, and levels, then organize information appropriately.

### Sample Vocabulary Matrix

Term	Paraphrased Definition	Example from Lecture	My Example
<i>Oligopoly</i>	<i>A market where a few firms produce all or most of the supply of a good or service</i>	<i>Airlines</i>	<i>Domestic car makers (e.g., GM, Ford)</i>
<i>Monopoly</i>	<i>A firm that produces the entire market supply of a good or service</i>	<i>Niagara or Mohawk</i>	<i>New York telephone local service</i>

## Affinity Grouping

This activity is used to break down a topic to identify and classify its parts. Identify, then write each concept on a sticky notes (or card). Then in small groups, or one large group, sort and organize the slips of paper into categories to identify common themes. Create a heading for each grouping. If using small groups, have each group review each other's or have them explain their categories.



## Boardwork Model

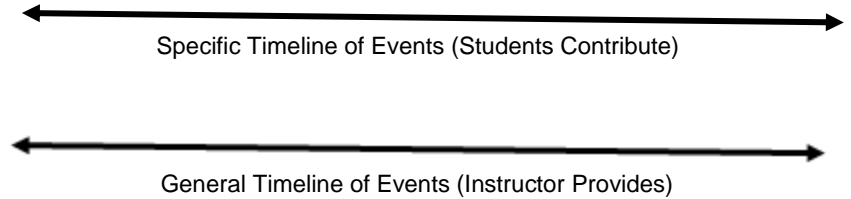
This is a method of organizing board work in order to facilitate an understanding of problem-solving strategies. The board should be divided into 4 sections:

- 1 - Prerequisite knowledge,
- 2 – Mathematical/Problem-Solving steps,
- 3 - Narrative of the steps,
- 4 - Additional Sample Problem

Encourage one student to fill out section 1 on the board. Then, encourage two students to simultaneously complete section 2 and 3 on the board. Lastly, have another student complete the 4th section. Encourage students to use this model when studying outside of class.

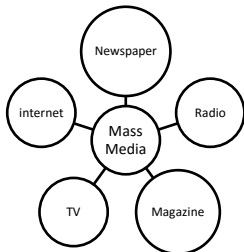
## Double Time Line

Construct a very general timeline of events to provide to students. Have student teams construct a duplicate timeline with additional details related to lecture material, readings, etc. This activity allows students to make connections between 2 different sources (e.g., lecture and the readings), or between related processes/time frames and how they may affect each other (e.g., historical events and literature of the time).



## Concept Mapping

This strategy will look like a big spider web on the board when you are finished. Have the students break into small groups and provide a central word, concept, or question around which to build the map. Start with a circle in the middle of the board and include the main idea within. Have students extend branches out from the central circle that includes all subtopics from the main idea. Students should continue to add additional branches with related topics and circle groups of branches that are linked. This mapping encourages students to see the overall picture and helps bring focus away from minute details and back to the main ideas.



## Think Aloud

Model for the students the thought processes that takes place when difficult material is read, or when difficult problems are solved. Use think aloud by verbalizing your thoughts while you are reading orally or working out a problem. Students will understand comprehension strategies better because they can see how the mind can respond to thinking through trouble spots and construct meaning for themselves from the text.

Have students try the think aloud process in pairs or teams while doing an in-class reading, or during problem-solving.

## Divide and Conquer

This strategy forces students to teach one another, rather than depending on the instructor to provide all of the material to students (i.e., lecture).

**Example 1:** Provide pairs or teams with concepts from the course. Have each team present/teach the concept to the class, and include an example or demonstration. Each team is responsible for “teaching” their peers the concept and answering other students’ questions.

**Example 2:** This strategy can be used to conquer a difficult reading assignment. The assignment should be divided up into meaningful sections and each student (or team) should be assigned one section. Ask the students to read and summarize their section. After they all have read the material, have each student read aloud their summary. Encourage students to ask questions and be prepared to emphasize areas students may have overlooked. Lastly, discuss the article as a whole.

Adapted from the Curators of the University of Missouri 2014 (10)

## Group Survey

Each group member is surveyed to discover their position on an issue, problem or topic. This process ensures that each member of the group is allowed to offer or state their point of view.

Hints/Variations:

- A survey works best when opinions or views are briefly stated. Be sure to keep track of the results of the survey.
- Incorporate movement by having students stand in a continuum based on a Likert scale (e.g., strongly disagree to strongly agree; never to always) or quadrants of the room (e.g., multiple choice options). This helps visually represent each person’s position on the issue, problem or topic.
- Have groups collect data from their group, then share results with the larger group/class. Compare group vs. class data to emphasize sample vs. population data.

Adapted from the Curators of the University of Missouri 2014 (13)

## Turn To a Partner

Students often are more comfortable sharing their thoughts with a peer, rather than sharing with the entire class. Have students work with partner on an assignment or discussion topic before beginning a whole class discussion.

Hints:

- This technique works best with the group participants who have already been provided with enough background on a subject that they can immediately move to a discussion with their partner without previewing or reviewing concepts.
- As students discuss with their peers, walk around the room and listen to conversations. To further encourage participation, share quotes you heard around the room, (e.g., “I heard some great discussion in that part of the room”, or “Who was it that said...?”)

Adapted from the Curators of the University of Missouri 2014 (20)

## Peer Lessons

Select several problems from related material. Divide the students into 4-5 groups. Give each group one problem and have them work on the solution, using their textbook and class notes, on a white board, flip chart paper, or a section of the board. Have each group come up and explain the problem in as much detail as they can. Have them show their thought processes and methods used in finding the solution. The instructor adds or corrects anything (s)he feels is necessary.

Adapted from the Curators of the University of Missouri 2014 (28)

## Assigned Discussion Leader

One person in the group is asked to present on a topic or review material for the group and then lead the discussion for the group. This person should not always be the regular group leader.

Hints:

- When assigning a discussion topic to individual members of the group, you may need to be prepared to allow a little time for the person leading the discussion to prepare for the discussion.
- This technique works best when everyone or nearly everyone in the group is given an assignment to be the "expert" on.
- Avoid having students self-select to lead the discussion by changing up who is the leader (e.g., the student at each table with the next birthday; the student at each table whose name is closest to the letter \_\_\_\_).

## One Minute Paper

The one minute paper is designed to help students realize what they know or do not know (i.e., check for understanding). Ask the students to take out a piece of a paper and write on a topic. Remind them it is most important that they put their thoughts on paper in their own words, not that they produce a polished piece of writing. Then have each student share their response with the group. Additionally, the instructor may choose to encourage conversation regarding similarities and differences between students' ideas.

Possible paper topics:

- What was the most important idea/insight today?
- A question I have that still needs addressing is...?
- What was the most challenging aspect of today's activity?
- Give an example that relates to the topic of the day.
- What was the most surprising and/or unexpected idea expressed in today's discussion?
- Was there a position taken in today's class that you strongly disagreed with? Why?

## Grab Bag

Place problems, topics for discussion, course concepts, etc. on slips of paper into a hat or bag. Students or teams must grab a slip of paper and solve or discuss the problem/topic.

Variations:

- Students grab sources and must correctly cite the source using appropriate style (e.g., APA, MLA) on the board.
- Students grab positions/arguments on an issue and must provide persuasive arguments from that position.
- Students grab math word problems to solve for the class.
- Students grab a vocabulary word and must define it and provide an example to the class.

The options are bound only by your imagination. The intrigue, of course, is in not knowing which slip of paper students will pull out.

## Think-Pair-Share

This process requires three stages. The students should be given a question, concept, or problem and then encouraged to think about it alone for a (short) designated time period. Then they pair with another student and discuss what they found individually for an additional time period. Lastly, the pairs join the large group and discuss their conclusions as a whole.

Hints/Variations:

- This works great with clickers so that initial students' options are captured before discussing with a partner.
- Try posing course misconceptions for discussion and have students convince their partner which is the right answer.
- If using clickers, have students re-vote after discussion with their partner to see if their thoughts have changed.

## Send a Problem

This strategy can work in pairs or teams depending on the size of the class. This works well in Math and Chemistry after a new concept has been taught to check for understanding. Generate a list of problems and assign each a different problem. Have students complete Step 1 of the problem on paper or a small whiteboard. After a minute, have them pass their problem to the right so that another pair/team can complete Step 2. Continue the process until all steps are complete.

Variation:

- This can also be used for process-oriented concepts. Have pairs/teams identify the first step in a process (e.g., mitosis, functional decision-making, needs analysis), then pass the problem to the next group. This is a great exercise to check for understanding on these concepts.

## Skeletal Notes

Create a set of incomplete lecture notes by making an outline with some of the parts missing. This helps students focus on main points during lecture and keeps them engaged as they must complete the partial notes during class. This also frees students from writing complicated formulas or wordy definitions as these should be provided in the skeletal notes.


EXAMPLE:

Meiosis

A. Interphase: DNA replicates


B. Prophase I

- Homologous chromosomes pair
- \_\_\_\_\_ move to poles
- \_\_\_\_\_ fibers begin to form
- nuclear membrane breaks down



C. Metaphase I

- Sister chromatids become attached to fibers
- Homologous chromosomes move to \_\_\_\_\_ plate



## Informal Quiz

This exercise can be used to check for understanding and spark discussion. An informal quiz consists of 5-7 questions that are read aloud by the instructor. The question should require short multiple choice answers or short words/phrases and focus on particulars of major points. The students cannot talk or share answers; however, they can refer to their notes or textbook. If they do not have the answer they should write down the question. The quiz should be followed by a debriefing where the short answers to the questions are expanded upon through discussion. Redirect questions so that students are answering the questions in a large group discussion. Allow the students to answer the questions in any order, and allow time for the other students to concur or disagree and encourage discussion.

## K\*W\*L

This activity helps students activate prior knowledge and link it to new information to make connections with what is already known. Have students complete a KWL chart like the example below:

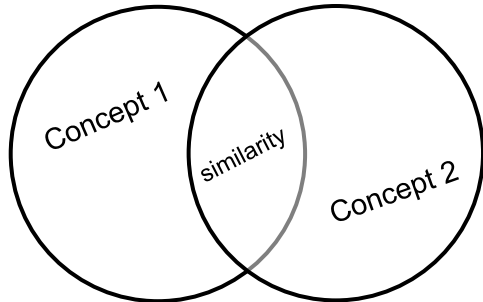
What I <b>K</b> now	What I <b>W</b> ant to Know	What I <b>L</b> earned

This activity can be used to help check understanding for particular concepts that students are having difficulties with. Towards the end of the session go back to the chart and have students correct any info in the K column, and clarify any questions remaining in the W column. Conclude the class by having students complete the L column.

## Venn Diagram

A Venn Diagram can be used to compare the similarities and differences between two concepts, systems or theories. Two overlapping circles are drawn on the board with each circle labeled as one of two concepts. Students will then write the similarities in the overlapping portion and then differences in the outer portion of the circles. This is a good visual technique for reviewing similar yet contrasting concepts.

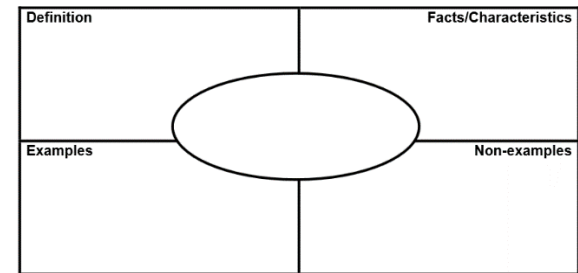
EXAMPLE:



## Frayer Model

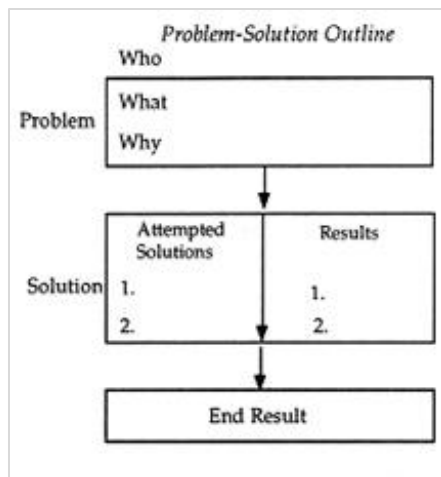
Starting with a single term familiar to students, have each group complete one of the four quadrants. Debrief the term. Then give each group a new term. The group will complete one quadrant before passing it along to the next group. Once all four quadrants have been filled in, each group in turn will debrief the concept with the whole group using the information collectively assembled by the class.

EXAMPLE:



## Problem-Solution Outline

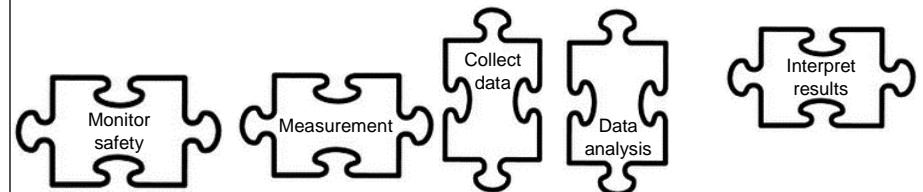
Start by posing a problem to the whole class. Small groups of students will identify the Who, What, and Why of the problem. Groups share out and write the details on the board. Each small group then formulates a proposed solution. Groups swap solutions, as each group attempts to apply the other group's solution. Each group will detail the results discuss the proposed solution. Eventually a workable solution is identified and the whole group comes together to debrief.



## Jigsaw

Divide students into 4-6 person jigsaw groups (or number of topic segments). Appoint one student from each group as the leader. Divide your lesson or reading into 4-6 segments (or equal to the number of topic segments).

Have each student learn one segment and provide them time to become familiar with it. Form temporary "expert groups" by having one student from each jigsaw group join other students assigned to the same segment. Expert groups discuss and clarify their segment, then join their original jigsaw group. Each "expert" will present their segment to the rest of the group so that each segment is taught to the group by individual students. The instructor should float from group to group to observe.



## Chalk Talk

This strategy encourages participation while making connections between course concepts. Write a question in the center of the board and ask half of the class to move up to a portion of the board. Ask for 5 minutes of silence as students write their responses to question posed. Have the other half of the class draw lines between postings to show connections/differences, ask questions, add to postings, provide examples etc. The instructor then adds responses and draws lines as needed. After a few minutes begin a whole class discussion about clusters of responses, outliers, what's missing, important questions and what's next.

Sample questions:

- Why is Theory A accurate?
- How do we decide if a hypothesis is correct?
- What's the most important thing to know about concept B?
- What is an example of concept C?

## Circle of Voices

This strategy encourages students to think about their position on a topic, and lets all students be heard at least once in the discussion. Begin by moving students into a large discussion circle.

Pose a question to the class and allow students to silently write down their thoughts/response. Participants go around the circle in order sharing their response. Each person has up to one minute of uninterrupted air time to give their viewpoint on the topic. No interruptions are allowed.

Then students move into a free discussion with the ground rule that every comment offered must somehow refer back to a comment made by someone else in the opening circle of voices. This need NOT be agreement - it can be a disagreement, a question, an elaboration, an illustration, & so on, but all comments must relate to something that has already been stated.

## Newsprint Dialogue

Divide the class into smaller discussion groups. Pose a question, problem or topic to the class. Each small group will summarize their answer, conversation, discussion on flip chart paper, or portion of the board. Allow individual members of the class to wander around the room and read all responses. Students should add comments or questions to other group's postings.

Conclude the session by debriefing the answers, conversations, discussions in the larger group by having each small group answer (and clarify, if necessary) the posted comments and questions.

## Class Backchannel

Social media 'backchannels' are a useful way to get students to ask questions, provide examples, respond to questions and/or offer reactions to the class. Backchannels bypass the dynamics of verbal participation by giving everyone an equal chance to speak, while providing anonymity. They allow students to ask questions as they occur to them – not merely when the instructor invites them.

Contrary to verbal interaction, it helps to democratize the classroom as no one student can dominate the discussion.

Be sure to project the backchannel during class so that students can see real-time comments. Also, be sure to refer to the backchannel periodically to answer questions, clarify terms, etc. throughout the class time.

## Stations

This activity offers an alternative to traditional lecture. It engages students by requiring them to move around the room and interact with learning materials as they examine, question, exchange ideas with peers, respond to prompts, and formulate their own thoughts.

Set out various "exhibits" around the room (e.g., flip chart paper, letters, quotes, multimedia presentations, charts, photos, cultural artifacts, specimens). Student groups will move among stations and complete a provided worksheet that gives directions and questions about each station in the exhibit.

## Hearing the Subject

Students "listen" to a text passage film clip, or audio clip, paying close attention to its forms of expression but refrain from evaluating or interpreting the work. Then in small groups, they paraphrase as much of what they witnessed to their team members as a warm up to a larger group discussion.

This activity encourages students to practice being still and to focus and concentrate on only audio cues.

## Moveable Elements

Give each group a set of cards or slips of paper with concepts or terms. Ask student groups to organize, sort, classify, categorize the items.

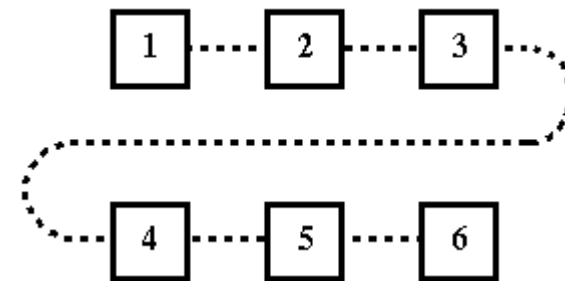
Conclude the session by debriefing the answers, conversations, discussions in the larger group by having each small group answer (and clarify, if necessary) the posted comments and questions.



In animal Biology, sorting of animals by order.

## Bridging Snapshots

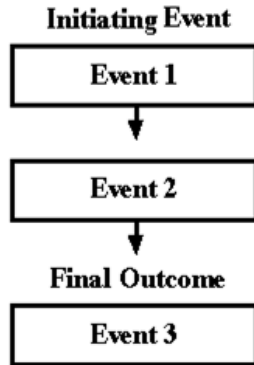
This visual organizer can be used to see (or map) changes over time, reveal the sequence of step-by-step methods, illustrate complex processes, and/or show cause and effect.





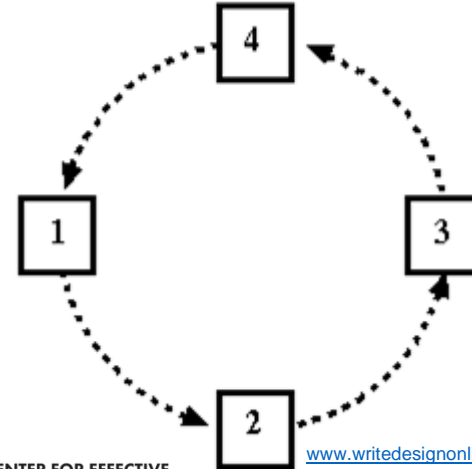
## Series of Events Chains

This can be used to describe the stages of something (the life cycle of a primate); the steps in a linear procedure (how to neutralize an acid); a sequence of events (how feudalism led to the formation of nation states); or the goals, actions, and outcomes of a historical figure or character in a novel (the rise and fall of Napoleon).



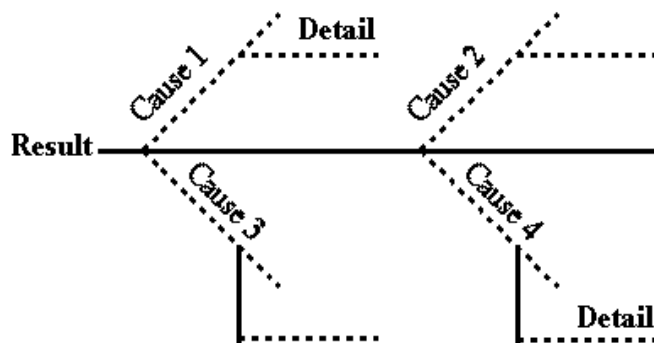
## Cycle

This visual organizer can be used to show how a series of events interact to produce a set of results again and again (weather phenomena, cycles of achievement and failure, the life cycle).



## Fishbone Map

This can be used to show the interaction of a complex event (an election, a nuclear explosion) or complex phenomenon (juvenile delinquency, learning disabilities).



## Spider Map

This visual organizer can be used to describe a central idea: a thing (a geographic region), process (meiosis), concept (altruism), or proposition with support (experimental drugs should be available to AIDS victims).

