

MONASH EDUCATION INNOVATION

Available Cards

Brainstorming

Cards

Case Study

Categorising Grid

Clarification Pauses

Concept Maps

ConcepTests

In-class Polling

Jigsaw

Large Groups Discussion

Limited Resource Problem Solving

Minute Paper

RSQC2

Socratic Questioning

Team Trivia

Think-Pair-Share

Top Twenty

Work on Walls





Brainstorming

a.k.a. Group ideation

Brainstorming is a creative process where knowledge is quickly generated and connected. Brainstorming can be structured or unstructured, narrowly focused or general, collaborative or individual, depending on the needs of the learning activity. The most common form of group brainstorming is to collaboratively explore understanding of a single theme and to creatively generate ideas.

The three most important strategies in using brainstorming for this purpose are to:

- 1) aim for quantity of ideas rather than quality at the beginning
- 2) allow any idea to be recorded, with critical review and elimination of ideas at a later stage
- 3) encourage thinking out-of-the-box and novel ideas

Brainstorming sessions have common pitfalls, including group-think, reliance on conventional ideas, idea stagnation and social anxiety of group members. These pitfalls can be overcome through planning, preparation and practice.





Brainstorming



- Categorising and ordering knowledge
- ► Collaboration and cooperation
- Critical thinking
- ▶ Decision-making



- Cards
- ▶ Case study
- ▶ Concept map
- ▶ Infographics

- ▶ Jigsaw
- Large groups discussion
- ▶ Work on walls

- Students are placed in groups and choose the most interesting topic from the current module. Students brainstorm the reasons why the topic is interesting and how the topic could be expressed clearly to others. Student groups then present their favourite topics and summaries to the class.
- 2. Students are placed in a group and given a case study to evaluate. The student groups begin their analysis with a brainstorming session, listing the theory and practices that may be related to the case study. The ideas can be grouped and ranked to determine which areas are most important and most difficult. The process allows for a formative evaluation of student understanding and for students to show creativity and collaboration in their approach to the case study.





Cards

a.k.a. Concept cards, Flash cards, MUD cards, Visual aids

Physical cards can be used in a variety of different ways to promote active learning. Rather than using flash cards for more traditional learning methods such as rote memorisation, active learning uses cards in a more effective way for physical representations of ideas or graphical representations that can be ordered, ranked, sorted or put into diagrams and structures.

MUD cards refer to the practice where students are each given a blank card and asked to write down the "muddiest" part of the learning session, or the part that was most difficult to understand. These are gathered and addressed.





Cards



- Categorising and ordering knowledge
- Collaboration and cooperation
- Critical thinking

- Decision-making
- Conceptualising systems, structures or processes
- ▶ Immediate feedback



- Brainstorming
- Categorising grid
- Concept maps
- ▶ Interactive diagrams
- Memory matrix
- ▶ Minute paper
- ► Misconception checks

- Students are given cards with different parts of a process and collaborate in small groups to discuss and organise the cards into the desired structure or process. Educators have an example of the desired solution available to show and allow discussion at the end.
- 2. Students are given a range of cards related to the concept. This activity works best if students are not given any direction in terms of how the cards should be ordered, as they engage in critical thinking and discussion to negotiate with one another. Results are shown to other groups and students discuss the merits of each chosen arrangement. Variations of this activity can require students to reorganise cards to make rows, matrices, tiers or other shapes.





Case Study

a.k.a. Authentic learning, Scenario based learning, Simulation, Problem based learning

A case study presents students with an authentic problem or situation they may encounter as a graduate. A comprehensive case study requires a situation or specific outcome which needs to be achieved, a description of the context (and constraints) of the situation, and supporting materials. For a single short (5-10-minute) activity, students may only need a few specific details, whereas for a longer activity they will need a more detailed picture of the scenario.

The case provides the frame for the activity. The task could be as broad as "what would you do in this situation, why did this happen, how could this be avoided in the future?", or there could be specific questions – "what does this patient require, when is the next report due?". Case studies can be released in 'phases' where more information becomes available at different times. Case studies can support students to develop analytical and critical thinking skills. The depth and complexity of a case study can vary depending upon the needs of the situation.





Case Study



- Collaboration and cooperation
- ► Identifying misconceptions
- Critical thinking
- ▶ Decision-making
- ► Authentic experience



- Brainstorming
- Concept maps
- Debates
- Demonstrations
- ► In-class polling
- Jigsaw
- Large groups discussion
- ▶ Peer review
- Picture prompts
- Video vignettes
- ▶ Work on walls

Example

1. Students are placed in a group and given a case study to evaluate. The groups begin their analysis with a brainstorming session, listing the theory and practices that may be related to the case study. The ideas can be grouped and ranked to determine which areas are most important and most difficult. The process allows for a formative evaluation of student understanding and for students to show creativity and collaboration in their approach to the case study.





Categorising Grid

a.k.a. Pro and con grid, Strip sequence

Students in groups of five or six are given three or four related categories that they have been studying and a list of randomised terms, images, equations or other items belonging to the categories. Students are given a limited amount of time to sort these items into their correct categories.

The list of items needs to be related to what students are currently learning or have learnt and is supplied in a random order.





Categorising Grid



- Categorising and ordering knowledge
- Collaboration and cooperation
- Critical thinking
- Identifying misconceptions
- ▶ Peer learning
- Immediate feedback



- Cards
- Large groups discussion
- Jigsaw
- Minute papers

- Limited resource problem solving
- ► Rotation review
- ► Think-pair-share
- ▶ Top twenty

Examples

- 1. Using Google Photos or Google docs and screen projection, the educator sets up shared groups with three or four folders (categories) in each group with terms or images in a central folder for the group to sort into their correct folder categories. The answers can then be shared with the whole class by the educator. The educator can then look for patterns identifying misconceptions to be addressed.
- 2. For each group, the educator marks up a large sheet of paper (A3 or A2) into 3 or 4 grid sections for each category. They supply students with the hardcopy images or printed terms and get them to physically sort the items into their correct categories onto the sheet of paper. In groups, students then move and review solutions devised by other groups.

SAL1



Clarification Pauses

a.k.a. Think break, Reflective pause

A clarification pause grants students the opportunity to reflect on recently covered material, to gather and organise their thoughts and allows the students to ask questions of the educator to clarify their understanding. A clarification pause is most effective after the students have engaged with a challenging or complex concept. Students should be encouraged to write down their question before asking it to the educator.

After an activity, presentation or finishing a discussion:

- 1. Ask the students to stop.
- 2. Pause.
- Ask the students to consider if they have any questions on the topic or points which need clarification.
- 4. Have the students write down their questions.
- 5. Call on students to ask their questions.
- Have a student record the questions and answers to post up for the students for later reference (optional).





Clarification Pauses



- ► Clarifying understanding
- ► Identifying misconceptions
- Critical thinking
- ► Reflective thinking or practice



- Any complex activity that needs a reflective element
- ► In-class polling
- Large groups discussion
- ► Minute paper
- ► Think-pair-share
- ▶ Top twenty

- After introducing a new topic, the educator can pause and ask the students to identify any areas of confusion before delving deeper into the topic. In particular, educators can ask students to point out any prior knowledge they are lacking in order to understand this new topic.
- 2. Students can often get confused after the introduction of a new concept that is challenging. Educators can ask students to clarify which specific aspects of the concept are confusing or identify misconceptions by asking students to explain how the concept applies in an authentic context.





Concept Maps

a.k.a. Conceptual diagram, Knowledge maps, Labelled direct graphs, Mind maps

Concept Maps are a visual method of linking knowledge, ideas and objects in a structure to show relationships, processes and flows. Using concept maps allows students to intuitively and creatively use words and symbols to arrange a representation of their understanding of the topic.

Concept maps are typically made up of nodes representing concepts, which are connected with terms describing relationships. These terms are framed so they make a sentence connecting the two terms (e.g., "is developed by", "sends to", "influences", "leads to", "is important to"). Concept Maps often have multiple hubs around important concepts, whereas mind mapping and brainstorming typically have a single hub.

Concept mapping can be used at all stages of the learning process; to explore ideas in initial stages of learning through to showing high level understanding of complicated interrelationships. Concept maps can be both a learning tool for students and an evaluation tool for educators.





Concept Maps



- Collaboration and cooperation
- Identifying misconceptions
- Critical thinking

- ▶ Decision-making
- Conceptualising systems, structures or processes



- ▶ Brainstorming
- ▶ Cards
- Case study
- ▶ Jigsaw

- Limited resource problem solving
- ► Think-pair-share
- Work on walls

- 1. Starting with a core concept, students are encouraged to explore related concepts. Initially this would work as a brainstorming exercise, but then would transition into asking students to find relationships between data, processes and concepts. The exercise could end with a discussion on the holistic nature of the knowledge and the importance of understanding the connections.
- 2. Students are given a case study, with data from a variety of sources. Students collaborate to discuss how the data may be interrelated and what conclusions can be formed from specific pieces of data or from sets of data. A sample of expert critical thinking can be shown and discussed in the class to allow students to understand how data can lead to specific conclusions.



ConcepTests

a.k.a. Conceptual multiple choice questions, Clicker questions

ConcepTests are conceptual multiple-choice questions that focus on a single concept, can't be solved using equations, have good multiple choice answers, are clearly worded and are of intermediate difficulty. The questions are designed to force students to think through their arguments being developed and provide them, as well as the educator, a way to assess their understanding of the concept.

ConcepTests can allow students to engage cognitive and meta-cognitive activity in their learning, asking them to consider what they don't know as much as what they know. Concept questions usually describe a problem, event or situation and ask students to reason about it and select the best option out of a small set of alternatives. The incorrect responses should be constructed to represent common errors or misconceptions.

The student responses direct the educator's next actions. Depending on the number of students answering correctly, educators may cover a concept again, prompt peer discussion or move onto another topic.





ConcepTests



- Collaboration and cooperation
- ► Identifying misconceptions
- Critical thinking
- ▶ Decision-making
- ▶ Peer learning
- ► Immediate feedback



- ▶ In-class polling
- ► Misconception check
- Student generated Q&A
- ► Think-pair-share
- ► Top twenty

Example

A blood platelet drifts along with the flow of blood through an artery that is partially blocked by deposits.



As the platelet moves from the narrow region to the wider region, its speed:

- 1. increases
- 2. remains the same
- 3. decreases





In-class Polling

a.k.a. Clickers, Audience response system, Keepads, Kahoot, MARS, Poll everywhere, Pre- or Post- class polling

In-class audience-polling technology allows students to provide quick responses to multiple-choice questions. Students answer questions or problems using their devices. Student responses are received, aggregated, and made available to the educator. During class, students' names may not be associated with responses, so they can answer freely. The educator can display the live results to students. Responses may be associated with students' names for grading purposes depending on the software used. Software packages include MARS, Poll Everywhere or Kahoot. Polling can also take place before or after class.

In-class polling provides quick feedback to students to help validate their own learning, can help students improve their retention of course material and provides an easy way for reluctant students to participate in active learning.





In-class Polling



- ► Clarifying understanding
- ► Identifying misconceptions
- ► Immediate feedback



- Case study
- ► Clarification pause
- ▶ ConcepTest
- ► Think, pair, share
- ► Recall, summarise, question, connect and comment
- ▶ Top twenty
- ▶ Trivia

- Educators check students understanding prior to introducing new content.
- Used prior, during or after lectures for immediate understanding of content by students.
- 3. Students' answers can help educators modify content in preparation for and during class.





Jigsaw

The Jigsaw activity can facilitate effective group work while helping students learn, consolidate and apply material. In the Jigsaw technique, students are divided into groups and each group is given a unique topic, task or problem to solve. Once they have completed their tasks, students form new teams made up of one member from each of the previous groups. Each person in the new team must share their key findings from the task and then work together to solve a new task or problem.

Jigsaw works best if all of the original tasks are related to the final task or problem. This way, members of the new team will each hold a piece of the puzzle and must effectively teach each other about their topic and work together to solve the new problem.





Jigsaw



- Identifying misconceptions
- Critical thinking
- Collaboration and cooperation
- ▶ Decision-making
- ► Authentic experience
- ▶ Peer learning



- Clarification pause
- ▶ Case study
- ▶ Categorising grid

- 1. The educator assigns related topics to each group to research and discuss. When students form new teams they should teach those topics to each other. After discussion, students analyse and apply their knowledge. Together, students create an object such as an information sheet, recommendation or poster showing an understanding of the topic as a whole.
- Educators engage students in cooperative problem-solving by breaking a large project into sub-projects. The educator gives each group a sub-project to work on. When students form new teams they should explain their projects to each other, and work together to solve the larger project/problem.





Large Groups Discussion

a.k.a. Class discussion, Group work

Students benefit from being able to explore and unpack an idea, concept, argument or topic as they engage with their peers. Tasks for group discussion should focus on problem solving and critical thinking. This way students share their thoughts and discuss how they came to those conclusions, enabling students to be exposed to a variety of ways of thinking.

Facilitation of the discussion is important to keep students on task and reach the desired outcomes for the discussion. When starting a discussion, include a set of questions to answer or objectives to achieve within the specified time limit. Group size should be kept to between four to seven students – the larger the group, the more time will be needed for discussion.

Guidance on forming groups:

- Each group should have a moderator to manage the discussion and a recorder to take notes.
- The moderator should ensure that each group member has a chance to contribute and that their contributions are noted.
- Avoid having the same people join the same groups constantly.





Large Groups Discussion



- Categorising and ordering knowledge
- Collaboration and cooperation
- ▶ Decision-making

- ► Authentic experience
- Peer learning
- Reflective thinking or practice



- Brainstorming
- ▶ Categorising grid
- ► Clarification pause
- ▶ Minute papers

- ▶ Jigsaw
- ▶ Socratic questioning

- The students are given a scenario and need to devise a solution within a clear set of given parameters. The scenarios should focus on real-world examples and get students to use a range of their skills and understanding. If the scenario is designed well, each group devises a unique solution.
- 2. Educators pose a challenging and complex question to the students and ask them to find a consensus between the group members. They ensure that the students write down their justifications for their positions and why they are taking that position. Each group needs to be able to clearly articulate why they are taking their final position and the pros and cons discussed. In this way, students understand differing views on the same issue.



Minute Paper

a.k.a. Short writing tasks

Minute papers (or other short writing tasks) give students the opportunity to reflect and focus their thoughts before continuing on. Students are asked to write a short reflective response, in under a minute, to a specific question. This helps the student take a moment to reflect and allows the educator to assess the student's understanding after collecting their responses. Typically, this activity is used at the end of a class or a topic of discussion.

Students can write their responses on cards or paper handed out by the educator or in an online space (e.g. a form or discussion forum). Questions should be focused and specific enough to give students direction in answering the question.





Minute Paper



- Categorising and ordering knowledge
- Clarifying understanding
- ► Authentic experience
- ► Immediate feedback
- ► Reflective thinking or practice



- Cards
- ▶ Categorising grid
- ► Clarification pause
- Large groups discussion

- ► Recall, summarise, question, connect and comment
- Student-generated Q&A
- ► Think-pair-share

Examples

The construction of questions is important. Avoid questions that are too open ended as they allow the students to not write anything. For example; "Is there any...?"-type questions allow the student to say 'no' without reflecting.

Questions should be open-ended to allow for effective engagement:

- 1. "What are the three or four most significant or meaningful things you have learned in this session?"
- "From today's session, list two concepts you feel you understood well and two that you are unsure about."
- 3. "What was the most interesting point, to you, that was discussed in your groups?"





Limited Resource Problem-Solving

a.k.a. Build from restricted components

Often, resources that are developed for students provide them with ideal or perfect scenarios. In practice, there are limitations or constraints, such as the resources, time, or budget available, which need to be considered. This activity allows educators to model these constraints during the learning experience to encourage students to think more creatively when problem-solving and to direct their own learning.

There are many ways to implement the limited resources activity. It could involve providing students with a limited number of physical resources or ideas, giving them a single source to work from (such as a textbook, guideline or journal), or setting a specific time limit in which they must complete the task. To get the most out of the activity, students should work in groups to solve problems together and educators should provide the opportunity for peer review and revision before giving feedback.





Limited Resource Problem-Solving



- Collaboration and cooperation
- Critical thinking
- Decision-making
- ► Authentic experience
- Peer learning



- Brainstorming
- Categorising grid
- Concept maps

- Flashcards
- Jiasaw
- ▶ Socratic questioning

- 1. Set a specific time for completion for the activity or create a scenario with a theoretical time limit to encourage prioritisation. For example, students could create a list of important questions to ask if they were given five minutes for an interview. This could be used in many contexts, such as in medicine when diagnosing a patient or taking medical histories.
- 2. Encourage students to create limitations for another group. For example, students list five things they would need to respond to a natural disaster. They write an explanation of how they would use the objects and pass the list of limitations to another group. The new group writes their own answer and compares it with the first group, before the educator gives feedback on both responses.





Recall, Summarise, Question, Connect and Comment

a.k.a. RSQC2

This five-step activity guides students quickly through a simple recall, summary, analysis, evaluation, and synthesis exercise and makes a great summary activity.

- ▶ Recall: Students make a list of what they recall as most important from the lesson.
- ▶ **Summarise**: Students summarise the essence of the lesson.
- Question: Students ask one or two questions that remain unanswered.
- ▶ Connect: Students briefly explain the essential points and how they relate to the goals of the class.
- ► Comment: Students evaluate and share feedback about the lesson.

This activity is most effective after a complex or integrated topic as it provides students with a structured and focused opportunity to synthesise their learning.





Recall, Summarise, Question, Connect and Comment



- ► Categorising and ordering knowledge
- Critical thinking
- ▶ Decision-making
- ► Identifying misconceptions
- ▶ Reflective thinking or practice



- Brainstorming
- ► Clarification pause
- ▶ In-class polling
- Minute paper
- Reflective activities

Example

1. At the end of a topic, the educator asks students to Recall, Summarise, Question, Connect and Comment on what they have learnt. The educator may then provide a few moments for students to post their questions to the discussion forum, or ask their peers. The educator could further call on students to share examples of connections they have made to previous topics, or to the next topic.





Socratic Questioning

a.k.a. Socratic method, Guided question, Structured questioning, Building from what is known, Socratic dialogue

Socratic questioning is asking open questions, for example "why do you think ...?" which challenge students to articulate their previous experience, current knowledge and to challenge assumptions. It is possible to use Socratic questioning to identify existing misconceptions (for example "why did you select the wrong answer on an MCQ test?") and to explore new topics, through a series of carefully planned logical questions.

Through structured questioning students respond and explore a new topic to gain a more detailed understanding. The questions chosen by the educator, the order, and the nature of the questions require students to use their existing knowledge on related and unrelated topics together with logic and critical thinking to engage with a topic.

Using this approach, the educator needs to ensure the students stay on topic, and will need to support students in developing their individual understanding through rephrasing questions, seeking clarification for answers provided and drawing links (however long) between a student's response and the topic at hand.





Socratic Questioning



- Collaboration and cooperation
- Critical thinking
- ► Identifying misconceptions



- Brainstorming
- ► Clarification pause
- Jiasaw
- Large groups discussion

- ▶ Limited resource problem solvina
- ► Think-pair-share
- ▶ Trivia

- 1. To explore a general aspect of course material: "Describe different types of tectonic movement along plate boundaries."
- 2. To encourage creativity and brainstorming:
 - "Think of as many causes as possible for the origin of a large boulder found perched upon a nearly flat plain that is underlain by a rock type different from that of the boulder."
- 3. To focus attention on a specific problem:
 - "Compare the evidence used by scientists to support the idea of biological evolution (or modern global warming) with that used by others who reject the possibility of evolution (or global warming)."





Think-Pair-Share

a.k.a. T.P.S.

The Think-Pair-Share technique is designed to encourage students to develop, discuss and share ideas around a particular topic, issue or problem. Students share and compare possible answers to a question with a partner before addressing the larger class.

This strategy can be used to gauge conceptual understanding, filter information, draw conclusions and encourage peer learning among students. Results can also signal to the educator to re-explain content or provide further support for students.

The format of think-pair-share is:

Think: Students think independently about a topic/issue/problem then form ideas of their own.

Pair: Students are paired into a group of two to discuss their thoughts, allowing the students to articulate their idea(s).

Share: The pair shares their finding with the whole class via presentation/discussion.





Think-Pair-Share



- ► Collaboration and cooperation
- Critical thinking
- ► Identifying misconceptions
- ► Peer learning



- Categorising grid
- ► Clarification pause
- ▶ ConcepTest
- ► In-class polling

- ▶ Jigsaw
- Minute paper
- ▶ Socratic questioning
- ► Top twenty

Example

1. TPS can be a quick conversation (1-5 minutes) between two students about a particular topic, issue or problem with more in depth thinking, discussion, and note taking. The educator might provide a thinking break in a lesson by providing an invitation for paired students to converse with each other. The process first involves a "quiet" time for each student to collect their thoughts and possibly make notes. The goal of the TPS strategy is for the students to have a genuine discussion about their own thoughts or ideas. They should collaborate, debate, coach and have a conversation about what they are thinking and learning. After the pairs have conversed for the allotted time, they can share with other pairs or with the class as a whole.





Top Twenty

a.k.a. The hit list

Creating a 'Top Twenty' list of common pitfalls in a topic is an effective way to deliver feedback, target misconceptions and allow students the opportunity for self-assessment and self-reflection.

Educators may create lists from past experiences with the topic and share them prior to an assessment task, learning activity or topic in order to guide student learning. Alternatively, educators may create lists as a direct result of student submissions, identifying common pitfalls to give students feedback at the end of a learning task, assessment task or topic.

Note: The "Top Twenty" may need to be a "Top Ten", "Top Fifteen" etc. depending on context.





Top Twenty



- Categorising and ordering knowledge
- Critical thinking
- ► Identifying misconceptions
- ► Immediate feedback
- ► Reflective thinking or practice



- Categorising grid
- ► Clarification pause
- ▶ ConcepTests

- ► In-class polling
- ► Misconception check
- ► Think-pair-share

- 1. At the end of an assessment, students are provided with information about the most common areas needing feedback. Sample responses may be included, though it is recommended that examples are reworked to make sure students' work is not recognisable. Students may be given examples of incorrect sentences or concepts and be asked to identify why it is an issue to add an element of problem solving.
- 2. Students are asked to generate their own 'top twenty'. This could be about top twenty learnings from a topic, changes in thinking, 'take away' points or simply identification of the 'top 10 X in Y' (e.g., top 10 diseases in Australia). These allow for brainstorming, categorisation, ranking, discussion and targeting of misconceptions.





Team Trivia

a.k.a. Trivia night, Game show, Jeopardy

The educator prepares a pool of questions, divided into different topics which act as the 'rounds'. Trivia style questions are used to consolidate content understanding and encourage students to engage in their learning through gamification of the curriculum, and to build social links with peers.

Arranging students into teams and establishing friendly competition assists in creating a supportive environment to facilitate peer learning. As students answer the questions, they must engage in discussion to reach consensus even where the group members may have differing answers. The immediacy of feedback also supports student learning.





Team Trivia



- ► Clarifying understanding
- ► Collaboration and cooperation
- ► Identifying misconceptions
- ▶ Peer learning



- ▶ In-class polling
- ▶ Socratic questioning

- 1. "A trivia night" session can be split into rounds, with fun content based activities (not just MCQs i.e. group crosswords)
- 2. Online tools (MARS and Kahoot) allows the educator to develop questions or polls and use music to build atmosphere, while students complete the assigned questions. Students gain points based on how long it takes them to answer the question or whether the answers are correct. Tools can show a leader board and the activity can be used in lectures or in small group classes/workshops/tutorials.





Work on Walls

a.k.a. Informal learning, Butchers paper activity

Working on walls allows students to collaborate in groups and physically move around the teaching space to complete tasks and achieve the desired outcome. Any tasks where students are solving something, producing something, or where students can draw or sketch may benefit from using this approach. Some teaching spaces have whiteboards installed or located around the room, allowing students to work directly on these surfaces. However, in other spaces the impact can be achieved using large paper sheets.

Working on walls has the added benefit of allowing ideas to be effectively presented to and by the group. Groups are able to present their ideas or solution to the class directly from the whiteboard.





Work on Walls



- Clarifying understanding
- ► Collaboration and cooperation
- Critical thinking
- ► Conceptualising systems, structures or processes



- Brainstorming
- Case studies
- ► Concept maps
- ► Interactive diagrams

- The educator assigns groups of students to each of the boards set up in the room (four or more works best), and assigns one topic/ question per board. After each group writes an answer, they rotate to the next board and write their answer below the first, and so on around the room.
- Students call out concepts and terms related to a topic about to be introduced; the group scribe writes them on the board. If possible, students group them into categories as they record the responses. This activity works to gauge pre-existing knowledge and focus attention on the subject.

