**Minute Paper**

**Description:** Ask students to write a response to an open-ended prompt on a notecard or sheet of paper (for 1–5 minutes).

**Example:**
Mechanical Engineering: “Today we discussed conductive heat transfer. In one minute, list as many of the principle features of this process as you can remember.”

**Time (Implementation) = 1–3 min.**

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**Muddiest Point**

**Description:** Ask students to write the concept or idea they are struggling with the most on a notecard or sheet of paper.

**Example:**
General: “On your note card, write the one concept you are having the most trouble understanding, and which you could use more practice on.”

**Time (Implementation) = 1–3 min.**

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**Application Card**

**Description:** After an important principle is introduced, have students write at least one possible real-world application of what they have just learned on a notecard or a sheet of paper.

**Example:**
Physics: “Newton’s 3rd Law states that ‘for every action, there is an equal and opposite reaction.’ Give three applications of Newton’s 3rd Law to everyday life around the house.”

**Time (Implementation) = ~5 min.**

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**Think-Pair-Share**

**Description:** Ask students to answer a question individually, then discuss their answers with a partner, and then have groups share their answers with the entire class.

**Example:**
General: “In solving this problem, what assumptions or simplifications can we make so that we can solve this using what we know from this class?” First, students jot down ideas individually. Second, students pair up with someone near them and share their thoughts. Third, groups share their ideas with the entire class.

**Time (Implementation) = ~5 min.**
**Graphic Organizer**

**Description:** Have students create a visual representation (e.g. concept map, graph, etc.), to demonstrate a main idea in a module/course and the relationships between concepts or variables.

**Example:**
Mechanical Engineering: Concept Map: In describing types of additive manufacturing (3D printing), students build a concept map that shows the primary methods, limitations, materials used, processes, etc.

**Time (Implementation) = ~10 min.**

**Case Studies**

**Description:** Prompt students to integrate course content with real-world situations by using real-life stories (cases) that describe what happened to a community, industry, or individual.

**Example:**
Engineering Ethics: Students review cases where ethical decisions must be made and determine what they would do in the given situation.

**Time (Implementation) = 10–50 min.**

**Jigsaw**

**Description:** A large topic is divided into smaller, interrelated pieces. Student groups are assigned one of the pieces to review/confirm knowledge. Then, the groups “jigsaw” so that there is a representative from each piece in each new group. Students then teach each other about their piece.

**Example:**
Mechanical Engineering: Give each group of students an overview of a 3D printing process (e.g., extrusion, powder bed fusion). Have students discuss the process, materials, advantages, and disadvantages in groups. After this discussion, create new groups that consist of at least one person who is familiar with each of the 3D printing processes. Students share their process with the rest of the group.

**Time (Implementation) = 20–30 min.**

**Peer Review**

**Description:** Students complete an individual assignment. Before turning in the final assignment, students submits a copy of their assignment to a peer who reviews it and provides feedback.

**Example:**
Computer Science: Students exchange pseudo code and give each other feedback before implementing.

**Time (Implementation) = 20 min.**
**Brainstorming**

**Description:** Introduce a topic or problem and then ask for student input. Give students a minute to write down their ideas.

**Example:**
Civil Engineering: “What are the possible safety issues we might encounter with the bridge we just designed?”

**Time (Implementation) = 5–10 min.**

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**Self-Assessment Quiz**

**Description:** Students take a quiz or complete a checklist to determine understanding of a topic. This can be done at the beginning of a semester/module/chapter to gauge prior knowledge.

**Example:**
Computer Science: “Describe the principles of a binary search tree.”

**Time (Implementation) = 5–10 min.**

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**Picture Prompt**

**Description:** Show students an image with no explanation, and ask them to identify/explain it, and justify their answers. Or ask students to write about it using terms from lecture, or to name the processes and concepts shown. Also works well as group activity. Do not give the “answer” until they have explored all options first.

**Example:**
Chemical engineering:

**Time (Implementation) = 5–10 min.**

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**Set It Up**

**Description:** After providing a quantitative problem, ask students to solve it using only variables and units, emphasizing the problem-solving process rather than the final numerical answer.

**Example:**
Electrical Engineering: “Using the provided circuit diagram, label the different components (resistors, capacitors, battery, etc.) with variable names. Identify which laws are applicable and set up the equations you would use to calculate the current through the circuit at the points identified in the diagram using only variables.”

**Time (Implementation) = ~10 min.**
Think Break

**Description:** Ask a rhetorical question, and then allow 20 seconds for students to think about the problem before you go on to explain. This technique encourages students to take part in the problem-solving process even when discussion isn't feasible. Having students write something down (while you write an answer also) helps assure that they will in fact work on the problem.

*Time (Implementation) = 1 min.*

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Empty Outlines

**Description:** Distribute a partially completed outline of the lecture or class period for the day and ask students to fill it in. Useful at start or at end of class.

*Time (Implementation) = 1 min.*

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Pass the Pointer

**Description:** Place a complex, intricate, or detailed image on the screen and ask for volunteers to temporarily borrow the laser pointer to identify key features or ask questions about items they don’t understand.

*Time (Implementation) = 1–3 min.*

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Hand Held Response Cards

**Description:** Distribute (or ask students to create) standardized cards that can be held aloft as visual responses to instructor questions. Example: green card for true, red for false. Or hand-write a giant letter on each card to use in multiple choice questions.

*Time (Implementation) = 1 min.*