


Instructional Strategies & Classroom Assessment Techniques (CATS) to Engage Students, Assess Understanding, and Provide Feedback

As you create opportunities to engage *all* students in learning and assess student understanding, be aware of the level of learning each technique is evaluating. Some techniques assess basic knowledge and recall while others assess critical thinking and application of concepts. Integrating some of these techniques into your instruction provides students with the metacognitive piece they need to be aware of what they know well and what they need to study. These techniques can be used for individual student reflection, group work, or reflective assignments. Not all of them need to be evaluated for a “grade;” they can be incorporated as a “norm” in your class. Not all techniques work for all instructors; choose the ones that best fit your comfort level and style.

The table below is adapted from *Classroom Assessment Techniques*, written by Thomas Angelo, and K. Patricia Cross. It includes the recommended purpose of the technique, a suggestion for implementing the technique, and options for using the results of the technique for student feedback. These strategies most closely align with the following domains on the CSU Teaching Effectiveness Framework: Instructional Strategies, Feedback and Assessment, and Inclusive Pedagogy. NOTE: “Online Compatible” indicates a technique that can be used in the online classroom with minimal modifications.

Basic knowledge, recall, and understanding of concepts/ skills

Technique	Procedure	Feedback Options (These options are suggestions and can be mixed and matched with several other techniques)
Background knowledge probes (Online Compatible)	Collect specific and useful information on students’ prior learning, focusing on specific information or concepts that must be known to succeed in subsequent assignments. This can be done in dialogue with the students or in writing: pre-test, student generated lists about a topic, sketches, etc... choose any technique from the list below; the <i>timing</i> of the technique determines whether you are collecting <i>background</i> knowledge or learned knowledge.	<ul style="list-style-type: none"> • Share generalizations with students in the form of a chart, data, or other format to demonstrate <i>why</i> you are covering (or not) certain material. • Students meet up with other students or groups to compare notes, add on to their own. • Instructor can collect, read a sample from the class in order to get a feel of what the students currently understand
Focused listing 	Ask students to produce a list of related terms (words or phrases) important to understanding that topic.	Students can compare lists with each other and then with a master list projected on the screen, making note of what they missed.
Misperception/ preconception (Online Compatible)	Learn students’ prior knowledge or beliefs that may hinder or block further learning. Ask for the information in dialogue or in writing.	Share common misconceptions with students and correct them.
Empty outlines (Online Compatible)	The teacher provides students with an empty/partially completed outline and gives them a limited amount of time to fill in the blank spaces. Students can work alone or in groups, depending on what is being assessed.	Students can first work individually then with a partner or group to fill in the blanks. Individual students can make note of what they still need to learn.

Basic knowledge, recall, and understanding of concepts/ skills

Technique	Procedure	Feedback Options (These options are suggestions and can be mixed and matched with several other techniques)
Memory matrix (Online Compatible)	The teacher builds, alone or with prior student input, a matrix of key ideas, in which each cell represents particular relationships across two dimensions (and their sub-dimensions). The teacher provides the matrix, asking student to relate ideas from different parts of the matrix.	See "Empty Outlines"
Minute paper (Online Compatible)	Ask students to write, in one minute, the answer to either of these questions: "What was the most important thing you learned during this class?" "What important question remains to be answered?"	Collect all papers. Read a sampling of 15 – 20 papers to give you an idea of what students have grasped. Address successes and gaps at the beginning of the next class.
Clearest/Muddiest Point (Online Compatible)	Ask students to write their answer to this question: "What was the muddiest point in the _____?" (e.g., in the lecture, in the book, in the discussion, in the film) This works great using 3 x 5 cards, email, discussion board or even an e-chat.	<ul style="list-style-type: none"> • One student's muddiest point could be another student's clearest, so have students share/teach each other in groups of 4 – 6 about these clear/muddy points. • After discussion, all groups to ask questions that did not get cleared up – or turn questions in on an index card/or electronically. • Collect clear/muddiest point notes, and choose 15 - 20 to read so that you know what your students are grasping and which concepts they still do not quite understand.
Sketch a Concept (Online Compatible)	Individually, student create a sketch, diagram, visual representation of a concept.	<ul style="list-style-type: none"> • In small groups, students share and give feedback, adding or editing the sketch where necessary. • Collect sketches and choose 15 - 20 to "read" so that you know what your students are grasping and which concepts they still do not quite understand. Reteach or show exemplars so students can see what they are missing.
Numbered Heads Together (Online Compatible)	Students form small groups (2 – 4) and number off. Students discuss a question/concept of your choice. Give a specified amount of time for discussion. (1 – 3 minutes).	After time is up, ask students of a certain number (let's say 2's) to raise their hands. Now call on any raised hand to share with the class what their group discussed. Repeat as many times as you desire. (This type of discussion forces all students to engage in conversation with other students since they do not know which number will be asked to share. If you ask, "What did your group discuss?" it takes pressure off the individual student to be right or wrong.)
Think-Pair-Share (Online Compatible)	Instead of thinking then discussing, students write their thoughts, knowledge, etc., <i>then</i> share with a partner or group.	
Write-Pair-Share (Online Compatible)		

Application of Concepts

Technique	Procedure	Feedback Options (These options are suggestions and can be mixed and matched with several other techniques)
Directed Paraphrasing (Online Compatible) Varied Voices (Online Compatible)	Ask students to paraphrase theory, jargon, and other specialized language into "normal" language. This CAT provides visibility into students' ability to translate highly specialized information into everyday language. After teaching a challenging topic, have students form groups of 4 – they should number themselves off 1 – 4. Assign each number a certain audience (i.e. a professional in the field for 20 years, an adult who knows nothing about the topic, a middle school student, a 1 st grader). Students write a short explanatory paragraph about the topic so that their assigned audience would understand it. Students share with their group members – group members help clear up any misconceptions.	Collect paragraphs. Read a sample of each "voice." Determine level of understanding and possible misconceptions and patterns of difficulty.
Student-Generated Test Questions (Online Compatible)	Students construct test questions and model answers. This allows the teacher to assess what students consider to be important, what they understand as fair and useful test questions, and how well they can answer the questions they have posed.	Groups can switch and solve each other's questions or give feedback if they feel it needs to be revised.
Human Tableau or Class Modeling (Online Compatible)	Groups of students create a short video, "living" scene or model process to show what they know.	Groups can vote on the scene or model that best represents the concept. "Winners" compete against other "winning" teams. Top 3 groups "perform" for the whole class. Nuances of concepts can be discussed.
Paper or Project Prospectus (Online Compatible)	Students provide a brief, structured first-draft plan for a term paper or project.	Students can learn to give useful peer feedback to each other using checklists or rubrics. This takes guidance and practice.
Application Cards/ Make a Connection	In pairs or small groups, ask students to make a list of connections to any of the following: <ul style="list-style-type: none"> • Previously learned concepts • The world outside of the classroom • Concepts learned in other classes • Concepts learned from books, media, etc. 	Students share with another group, give each other feedback, ask questions – the group decides on the top 2 connections that help make the concept clear to everyone. Students share these two with instructor, who shares some of them with the class.
Make a Prediction (Online Compatible)	Individually or in small groups, students predict the outcome of an explanation or experiment based on current knowledge. This can be done through discussion or written.	Students share predictions and reasons for predictions in small groups. Students "defend" predictions before agreeing on a "correct" prediction.

Analysis, Critical Thinking & Evaluation

Technique	Procedure	Feedback Options (These options are suggestions and can be mixed and matched with several other techniques)
Categorizing Grid	Students sort a teacher-provided scrambled list of terms, images, equations, or other items into one or another of the pre-defined categories.	Students can compare lists with each other and then with a master list projected on the screen, making note of what they missed.
Defining Features Matrix	Students categorize concepts according to the presence or absence of important defining characteristics.	Students can compare categories with each other and ask questions and make suggestions where appropriate.
Pro and Con Grid (Online Compatible)	Students identify pros and cons associated with a particular act, event, issue, etc.	Students can meet up with another group and share chart, giving at least one new idea to each other and clearing up any misconceptions they think the other group might have. The instructor roams the room, taking notes on what students seem to have a grasp of and what misconceptions might still be out there and shares these notes with the class.
Content, Form, and Function Outlines (Online Compatible)	Students identify the Content (what?), Form (how?), and Function (why?) of a message, text, news story, essay, etc... in three columns	In partners, students compare outline, ask questions, fill in gaps for each other.
Analytic Memos (Online Compatible)	Students write a one- or two-page analysis of a specific problem or issue, usually directed to a particular audience. Think briefing memo. Think white paper.	Memos can be exchanged with a partner. Partners summarize memo with <u>(Someone)</u> wanted ____ but ____, so ____ based on the memo.
Take a Stand	Given a scenario about a concept, students literally "take a stand" on either side of the room according to their belief about a concept/issue. Students then find a person to share the reasons for their "stand." (2 min total). Students then find a person on the opposite side of the room and share the reasons for their stand with someone who believes opposite. (2 min. total)	Students can write a paragraph defending their stand and post it on Canvas. The instructor requires students to post comments on at least two other student stands. The instructor reads a sample of stands to determine the level of understanding students have on the concept/issue and shares with students what they understand "as a group," what misconceptions they might have, and what they might be missing.

Synthesis and Creative Thinking

Technique	Procedure	Feedback Options (These options are suggestions and can be mixed and matched with several other techniques)
One-Sentence Summary (Online Compatible)	Who does what to whom, when, where, how, and why? OR <u>Someone</u> wanted but _____, so _____. Or Student choice summary	Students can form groups of 5 – 7 to quickly share (anonymously) their one-sentence summaries. Groups can decide on the strongest and share with class.
Word Journal (Online Compatible)	Two-part response—students summarize a short text in a single word (or metaphor); then, the students write a paragraph or two explaining why he or she chose that particular word (or metaphor) to summarize the text. This can be used for theories, ideas, constructs, etc. in addition to texts.	This can be a homework assignment, posted and commented on in Canvas.
Generate Quiz/ Test Questions (Online Compatible)	After you've presented or discussed a main topic of a lesson (or at the end of class), ask students to generate 1 or 2 possible questions they imagine would be on a quiz or test.	<ul style="list-style-type: none"> • In partners, students check each other's question and offer feedback. • If time allows, partners meet up with other partners and answer each other's test questions. • Students turn in test questions. Instructor chooses a sample of 15 – 20 to read to assess level of understanding of concepts.
"So What" paragraph (Online Compatible)	After you've presented or discussed a main topic of your lesson, ask the students, "So What?" So, what does it all mean? How does it connect to what you've already learned? What usefulness does the concept serve within this course of study? How does it connect to the learning objective for this lesson or course? Ask them any question that requires them to apply or synthesize information. Give them about 3 minutes to write this, "So What?" paragraph. (This could also be a homework assignment posted on Canvas.)	<ul style="list-style-type: none"> • Students meet with a partner or small group to share and give each other feedback on their paragraph. Students nominate other students to read "excellent" paragraphs aloud. You can have students share 1 or 10, the number is up to you. • Students post these on Canvas. The instructor reads a sample to determine level of understanding of the bigger concept.
Approximate Analogies (Online Compatible)	A is to B as . . . Can students "capture" the relationship? (Mass is to volume as _____ is to _____.)	<ul style="list-style-type: none"> • Students practice with an instructor created analogy then write their own analogy "puzzle" for other students to solve.
Annotated Portfolios (Online Compatible)	Students construct a portfolio of a limited number of examples of their creative work, supplemented by their own commentary on the significance of these examples.	<ul style="list-style-type: none"> •

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Impossible Metaphors (Online Compatible)	<p>Take a main concept or concepts from a recent lesson. For the purpose of this explanation, let's choose 'photosynthesis.' Split students into groups of 5 – 7. Ask them to number themselves off 1 – 7. On a screen in the front of the room, list 7 nouns (<i>examples</i> below, keep them simple) and number them like this:</p> <ol style="list-style-type: none"> 1. a toaster 2. a bicycle 3. a thunderstorm 4. a dinosaur 5. a baseball game 6. the ocean 7. a birthday party <p>According to their number, students are to write a paragraph-long metaphor comparing the concept from class (i.e. photosynthesis) to whichever number they have. Number 1's will compare photosynthesis to "a toaster," 2's to "a bicycle," etc...</p>	<ul style="list-style-type: none"> • Students post metaphors on Canvas for other students to comment on, add to, give feedback on... • Students post metaphors on canvas – anonymously – students vote on the 5 that best represent the concept. Instructor reads ones with top 10 votes and shares a few in class, asking students to explain why they capture the concept so well.
Invented Dialogues (Online Compatible)	<p>Students synthesize their knowledge of issues, personalities, and historical periods into the form of a carefully structured illustrative conversation. Can be written or enacted (live or recorded, possibly for later Web-streaming).</p>	<p>Students post these on Canvas. The instructor reads a sample to determine level of understanding of the bigger concept.</p>

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<p>Concept Mapping (Online Compatible)</p>	<p>(Students construct drawings or diagrams showing the mental connections they make between a major concept and other concepts they have learned. Documenting and being able to explain the connections among concepts helps the students recognize their capacity to engage in complex thought processes. Teachers can trace the connections to understand errors in students' thinking processes.)</p> <p>In partners or small groups, students create a concept map with all the main concepts presented in lecture thus far. To get students started, make a list of 3 – 5 important concepts (just the words) and have students organize these in any way they see fit, drawing lines between concepts that connect and writing how they connect on those lines.</p> <div data-bbox="346 673 1060 1307" style="text-align: center;"> <p>Figure 4</p> </div>	<ul style="list-style-type: none"> • Students can create these on large sticky notes to be displayed around the room. Two groups can view each other's maps, compare and ask questions of each other. • Walking around the classroom, the instructor finds exemplars and shares with class with explanation as to why they're exemplars. Exemplars can be displayed after class so students can take a photo of them to study. • Instructor can collect, and depending on the number of maps, read a sample of them to determine student understanding of connections between/among concepts. • Students can take a photo of their map and post to Canvas. Instructor assigns discussion of maps. Students can point out good connections, ask questions, or clear up possible misconceptions for each other.

Problem Solving (metacognition, types of problems, strategies for solving)

Technique	Procedure	Feedback Options (These options are suggestions and can be mixed and matched with several other techniques)
Problem Recognition Tasks (Online Compatible)	Students are asked to recognize and identify the particular type of problem each example represents.	Students work individually, then with partners, then in groups to compare and problem solve misunderstandings.
What's the Principle? (Online Compatible)	The teacher provides students with a few problems and asks them to state the principle that best applies to each problem. Documented Problem Solutions	See "Problem Recognition Tasks" above
Documented Problem Solutions (Online Compatible)	The teacher asks students to keep track of steps they take in solving a problem—a kind of "show and tell." These can be in paragraph form or a bulleted list. Students become aware of how they solved those problems and how they can adapt their problem-solving routines to deal with messy, real-world problems.	Ask students to nominate "excellent" process explanations for you to collect and possibly share for all to see. This allows students to hear an explanation from a student voice, which some might be able to understand better than an instructor voice. It also recognizes hard work.
Audio- and Videotaped Protocols (Online Compatible)	Students capture each other, individually or in groups, solving problems, then critique and provide feedback on what was displayed.	Students post these on Canvas. The instructor reads a sample to determine level of understanding of the bigger concept.