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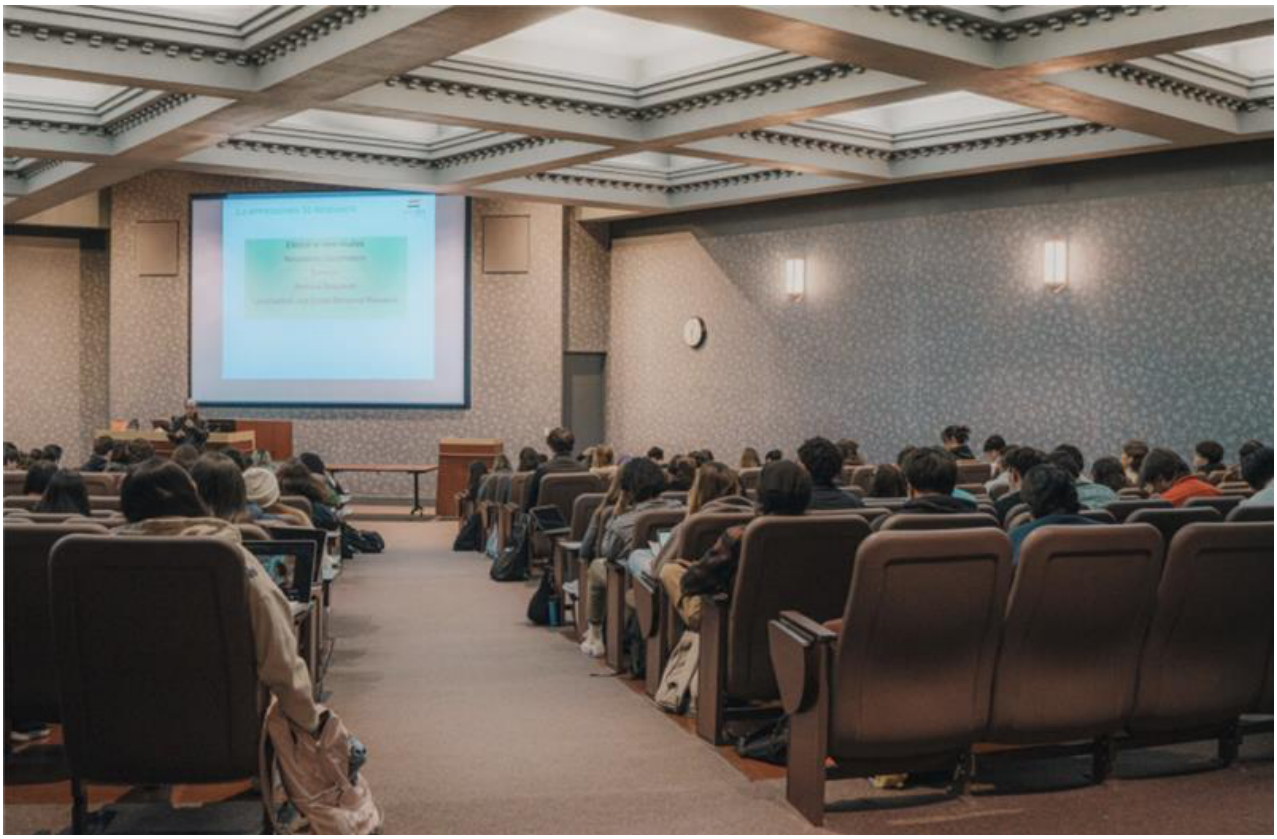

Effective Strategies for Teaching Large Classes in Higher Education

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How can effective high impact practices support quality instruction in large higher education classes?

Effective **High-Impact Practices (HIPs)** can significantly improve **quality instruction in large higher-education classes**, even when student numbers make teaching more complex. These practices work because they increase **student engagement, interaction, accountability, and deeper learning**, which helps overcome the anonymity and passivity that often accompany large classes.

1. Increase Student Engagement Through Active Learning

Large classes often encourage passive listening, but **High-Impact Practices** and especially active learning strategies promote consistent, purposeful interaction.

How this supports quality instruction

- Students actively process concepts rather than just listen.
- Instructors quickly gauge comprehension.
- Engagement and attention increase for all.

2. Strengthen Student–Faculty Interaction

Even in large classes, structured **HIPs** allow meaningful contact with instructors, and Active Learning structures ensure students also receive support from peers.

How this supports quality instruction

- Clarifies misunderstandings early.
- Humanizes the learning experience in large lectures.
- Creates multiple layers of feedback (instructor + peer).

3. Promote Peer Collaboration and Learning Communities

Active learning structures build cooperative, interdependent student communities essential for large courses.

How this supports quality instruction

- Students teach and explain concepts to one another.
- Peer support improves achievement and persistence.
- Reduces isolation and increases inclusion.

4. Embed Real-World, Applied Learning

HIPs prioritize authentic learning tasks; active learning structures help students collaboratively build understanding of applied real-life scenarios.

How this supports quality instruction

- Makes learning more motivating and relevant.
- Encourages higher-order thinking and problem-solving.
- Creates personalized learning experiences in large settings.

5. Use Frequent, Low-Stakes Assessment (with Feedback)

HIPs encourage regular, low-pressure assessments; active learning strategies provide instant formative checks.

How this supports quality instruction

- Reduces stress tied to large high-stakes exams.
- Offers immediate insight into student understanding.
- Creates structured accountabilities for all participants.

7. Support Metacognition and Deeper Reflection

HIPs emphasize reflection; active learning builds in structured turn-taking that enhances reflective thinking.

How this supports quality instruction

- Students understand *how* they learn.
- Supports transfer of knowledge across contexts.
- Gives instructors insight into thinking patterns.

8. Leverage Technology to Scale Engagement

Technology supports **HIPs** and helps scale active learning structures in very large courses.

How this supports quality instruction

- Makes collaborative work manageable even with hundreds of students.
- Provides channels for participation beyond the physical classroom.
- Automates' grading and feedback where appropriate.

Summary:

High-Impact Practices combined with active cooperative learning strategies transform large classes by increasing engagement, deepening collaboration, strengthening faculty-student relationships, and supporting equitable participation. With technology integration, both **HIPs** and active learning structures scale effectively, turning large lectures into interactive, supportive learning communities where all students can succeed.

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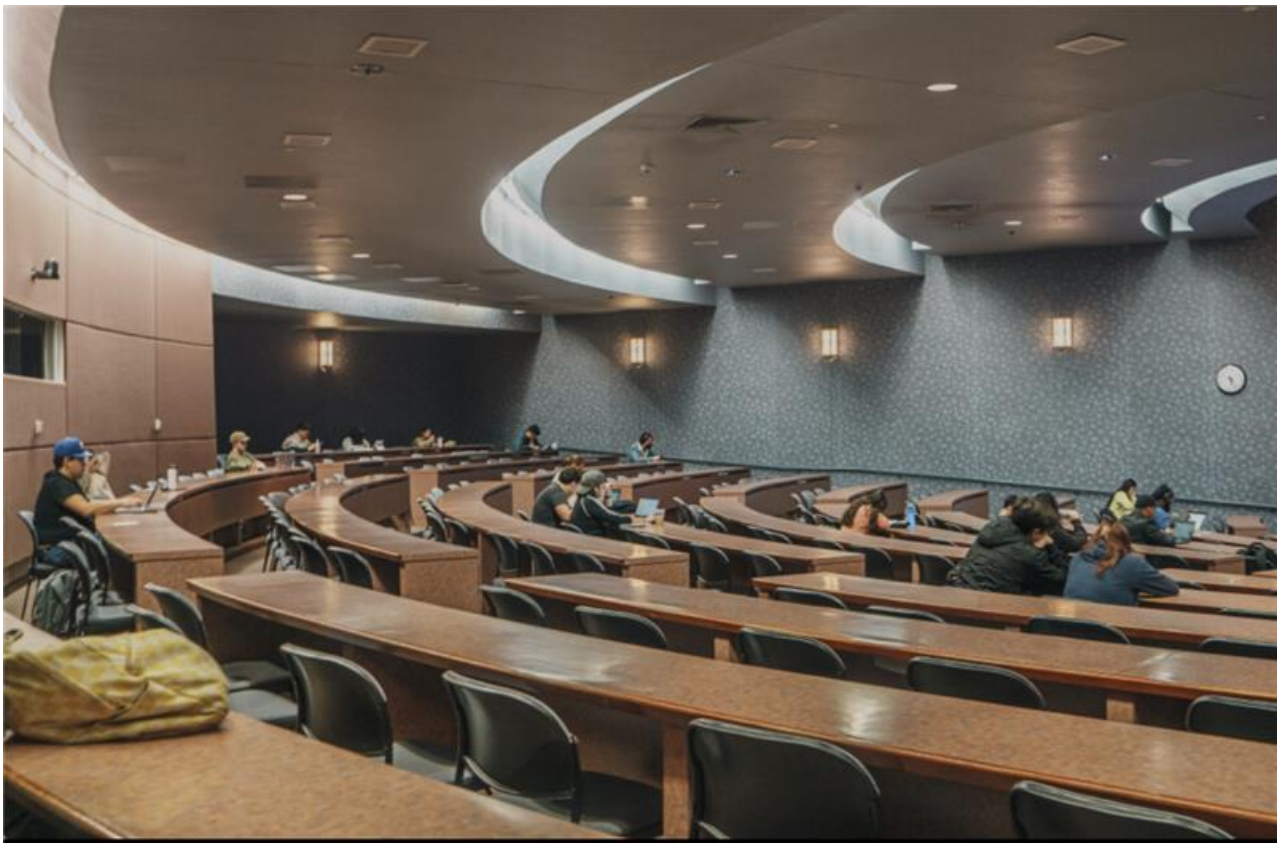

Active Learning Strategies

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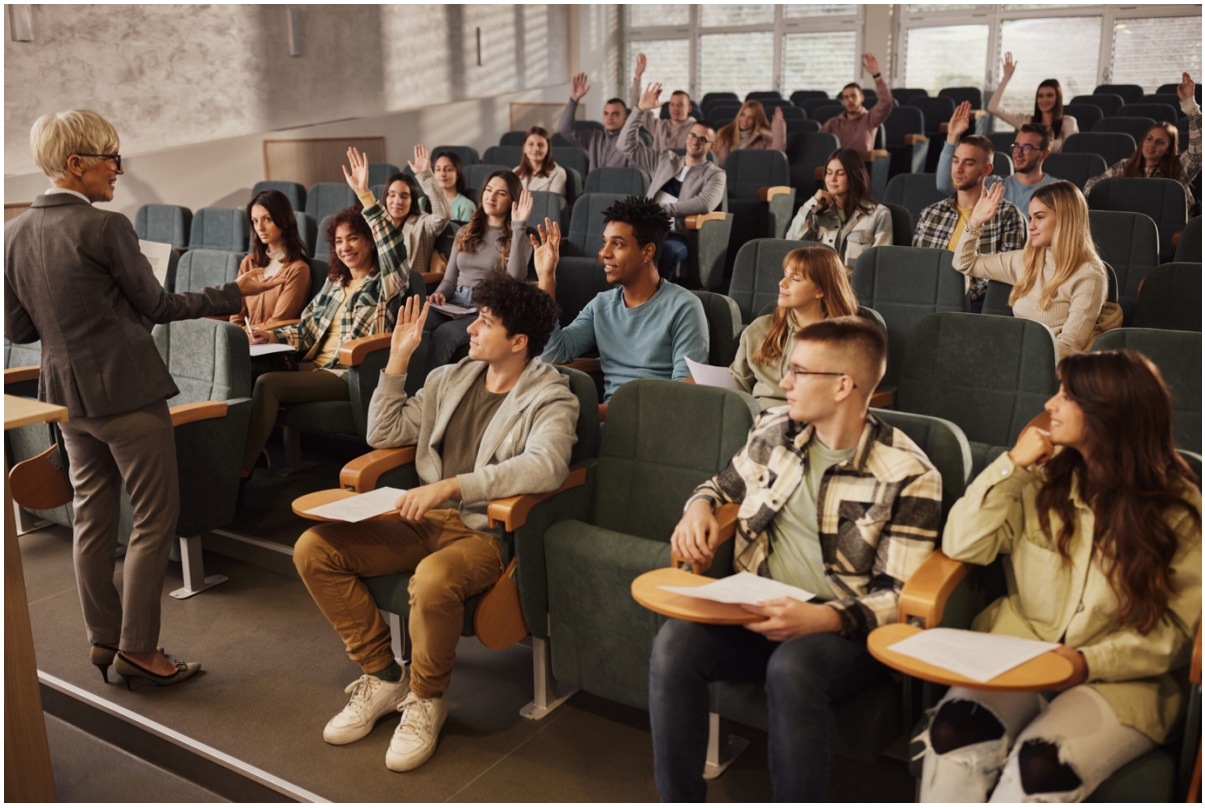
Think-Pair Share



Use Cases

Think–Pair–Share is an active learning strategy widely used in higher education to promote student engagement and deeper understanding. Instructors pose a question or problem and give students time to think independently, encouraging individual accountability and reflection. Students then pair up to discuss their ideas, compare perspectives, and refine their thinking through peer interaction. Finally, pairs share their insights with the larger class, allowing diverse viewpoints to surface and supporting collective learning while creating a low-stakes, inclusive environment for participation.

A. Concept Check / Clarification

After introducing a complex theory, equation, or model:

- **Think:** Students write their interpretation.
- **Pair:** Compare and reconcile differences.
- **Share:** Selected pairs explain; instructor probes misunderstandings.

B. Solving Discipline-Specific Problems

Great for STEM:

- Analyze a data set
- Sketch a graph
- Interpret a chemical reaction
- Map a sociological pattern
- Diagnose a case study in nursing, psychology, or business

C. Debates in Humanities and Social Sciences

- Ethical dilemma (philosophy)
- Policy critique (public administration)
- Interpretation of a text or primary source (English/history)

D. Application of Theory

TPS can help students translate theory to practice:

- Apply leadership theory to a workplace conflict
- Use communication theory to analyze a media example
- Apply supply–demand concepts to a real economic event

E. Pre-Exam Review / Retrieval Practice

- Students attempt a question independently
- Pair to discuss reasoning
- Share common challenges or efficient solution methods

This video demonstrates the **Think-Pair-Share** active learning technique being explained and used in an course setting, giving you a real example of how it works with older students in higher ed (with individual thinking, partner discussion, and class sharing)

https://youtu.be/fqrOxeL-fwk

Rubrics

1. A. Participation Rubric (0–2 points per TPS event)

Criteria	Points	Description
Think	0–1	Student submits a brief written/thought record (paper, LMS, or clicker poll). 1 = complete.
Pair	0–1	Student engages in partner sharing; instructor TA's check for engagement visually or through spot checks.
Share	Optional	Could be extra credit for volunteering or sharing in discussion boards after class.

2. Reflection Rubric (Short Written Reflection, 0–4 points)

Criteria	Points
Accuracy of concept explanation	0–1
Clarity of reasoning	0–1
Integration of partner's idea	0–1
Question or insight for deeper discussion	0–1

3. Group Accountability Rubric

Used when TPS ties into larger projects:

- Collaboration quality
- Completion of all three TPS steps
- Contribution to a collective answer sheet or forum post

Unique Grading Approaches (Scale to Large Classes)

A. Micro-Grades (Tiny Points, Frequent)

Assign 1–3 points per TPS activity.
Automatically boosts engagement without overwhelming grading.

B. Completion-Only Grading

You either did TPS or didn't.
Easy to track via:

- Clicker response
- LMS quick submission
- Exit slip
- QR code check-in for the "Share" stage

C. Collective Pair Score

Pairs submit one combined response; half of class graded per session.
Rotates weekly so workload stays low.

D. Random Audit

Collect work from only **10–15%** of pairs each week and apply the grade to all.
Students stay accountable without administrative overload.

E. Self-Report Check

Students briefly self-assess:

- "I completed all steps of TPS today."
- "Our pair discussion improved my understanding."
  This is logged for participation credit.

Scripting (How to Articulate TPS to Students)

Intro Script (Instructor)

"Today we're using *Think–Pair–Share*, a strategy that helps you clarify your ideas before we discuss it as a class.
First, you'll take one minute to think alone and jot notes.
Then, you'll turn to a neighbor to compare answers.
Last, I'll invite a few pairs to share insights. This matters because explaining your thinking improves understanding and retention—more than listening alone.
Everyone participates; no one is put on the spot."

Transition Script

"Okay—wrap up your individual thinking.
Now turn to your partner on your left or right.
Explain your reasoning and listen to theirs.
You have two minutes."

Share-Out Script

"Let's hear from two or three pairs.
What similarities or differences did you notice?
Did your partner say something that clarified the concept for you?"

Assessment Script

"Please upload your two-sentence summary to the LMS before the end of the day for your participation credit."

Best Practices (Large Class Specific)

A. Time the Steps Strictly

Large classes lose focus without structure.
Use timers on screen:

- Think = 1–2 minutes
- Pair = 2 minutes
- Share = 3 minutes

B. Create Pre-Assigned Partner Zones

Seat students in stable pairs or clusters to eliminate chaos during the "Pair" phase.

C. Use Technology for the "Share" Portion

- Live polls
- Chat tools
- QR-coded short-answer forms
  Improves inclusivity when sharing aloud is not feasible.

D. Keep Prompts High-Quality

Use questions that require:

- Analysis
- Evaluation
- Application
  Avoid fact recall for TPS.

E. Train Students Early

Spend the first week teaching TPS norms:

- Respectful listening
- Equal talk time
- Shared accountability

Supporting Research

A. Active Learning Literature

- Freeman et al. (2014), *PNAS*: Meta-analysis shows active learning increases exam performance and reduces failure rates in STEM courses.
- Prince (2004): Active learning measurably improves conceptual understanding.

B. Cooperative Learning Research

- Johnson & Johnson (2009): Structured peer interaction improves achievement and retention.
- Kagan (1994): Cooperative structures increase engagement, equity, and academic results.

C. Large-Scale Classroom Studies

- Crouch & Mazur (2001) on Peer Instruction: Students explain better when they first think individually and then pair.
- Bruff (2009): Combining clicker questions with peer discussion improves conceptual gains in large lecture settings.

Together, these findings strongly support the effectiveness of Think–Pair–Share as part of an active learning / cooperative learning pedagogy.

Combining Think-Pair-Share with Other Strategies (For an Engaging Environment)

A. TPS + Clickers

- Think - Answer via clicker
- Pair - Discuss discrepancy
- Share - Vote again
  This mirrors Peer Instruction and boosts conceptual gains.

B. TPS + Jigsaw

Students first process information using TPS, then join “expert groups.”
Useful for complex topics with multiple components.

C. TPS + Gallery Walk

- Think/Pair on a prompt
- Post pair ideas
- Students circulate to observe others' work

D. TPS + Debate Format

Pairs first take opposing sides using TPS.
Then pairs form groups of four and negotiate shared positions.

E. TPS + Problem-Based Learning

Use TPS to:

- Define problem
- Identify assumptions
- Compare initial hypotheses

F. TPS + Reflection Journals

After the Share phase, students reflect:

- What changed in your thinking?
- How did your partner influence your understanding?

G. TPS + Rally Robin

After the pair phase, expand into a 4-person group where each person takes turns giving ideas.

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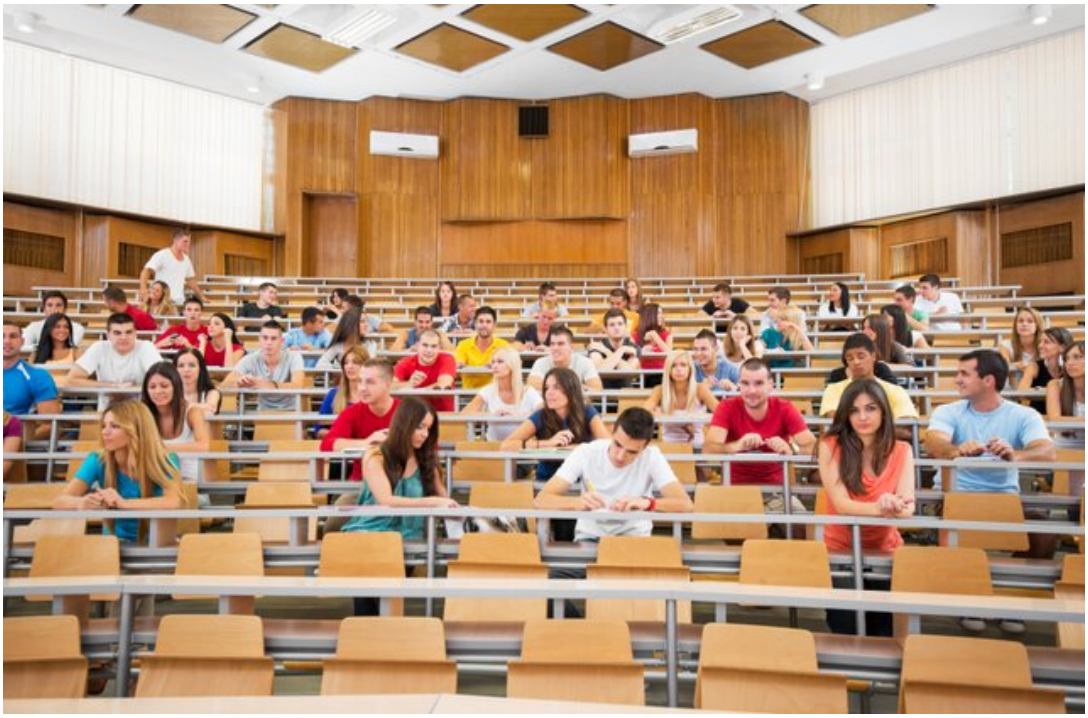
Rally Robin



Use Cases

Rally Robin is a collaborative learning strategy used in higher education to encourage active participation and equitable student voice. Working in pairs, students take turns rapidly sharing responses to a prompt, question, or problem, which helps reinforce content knowledge and build fluency in thinking and communication. This structured turn-taking ensures that all students contribute, supports peer learning, and keeps discussions focused and energetic, making it especially effective for brainstorming, reviewing concepts, or generating multiple ideas in a short amount of time. Rally Robin works best in large classes when the **task is bounded, time-limited, and cognitively focused**.

High-value use cases

- **Concept activation**: “List as many factors that influence X.”
- **Application checks**: “Name steps you would take to solve this problem.”
- **Evidence generation**: “Identify evidence from the reading that supports the claim.”
- **Comparative thinking**: “Alternate similarities/differences between A and B.”
- **Exam preparation**: “Alternate likely exam questions or key terms.”

Avoid using Rally Robin for

- Open-ended debates
- Complex synthesis requiring long explanations
- Tasks without a clear stopping rule

Rule of thumb for large classes:

If students can generate **multiple short responses**, Rally Robin is a strong fit.

Video: *Branching Out: Rally Robin* — this video demonstrates how Rally Robin works in a classroom context — partners take turns answering prompts aloud.

https://www.youtube.com/watch?v=o272wxydg4A

Rubrics

Rally Robin is rarely graded for *content quality* in large classes; instead, rubrics focus on **participation, process, or product sampling**.

Sample Process-Focused Rubric (0–2 points)

Criterion	0	1	2
Participation	Did not participate	Partial participation	Full participation
Alternation	No turn-taking	Inconsistent	Clear alternation
On-task	Off-task	Mostly on-task	Fully on-task

Why this works at scale

- Observable behaviors
- Low instructor subjectivity
- Can be assessed via peer confirmation or spot checks

Unique Grading Approaches for Large Classes

A. Completion-Based Credit (Most Common)

- Credit awarded for **submission, polling response, or exit ticket**
- Rally Robin itself is *practice*, not performance

B. Group Artifact Sampling

- Each pair submits **one combined response**
- Instructor grades **randomly selected submissions**
- Publicly explain sampling to increase accountability

C. Meta-Grading

Students submit:

- "One idea my partner contributed"
- "One idea I contributed"

This reinforces:

- Listening
- Equity
- Accountability without grading every exchange

Scripting: How to Explain Rally Robin to 100+ Students

First-Time Use Script (Highly Structured)

"You'll do a **Rally Robin**. That means you and your neighbor will **take turns**, one idea at a time.
Decide who goes first. Partner A gives one answer. Partner B gives one answer. Then A again.
Each response should be **short—one sentence or less**.
You'll have **90 seconds**. When the timer ends, stop—even if you're mid-thought."

Reinforcement Script (Later in Term)

"Rally Robin with your neighbor. Alternate responses. Short answers. Go."

Reset Script (If Noise/Confusion Rises)

"Pause. Remember: one idea, then switch. This is not a discussion—this is rapid turn-taking."

Best Practices (Large Class Specific)

Structure Is Non-Negotiable

- Always show:
  - Prompt
  - Rules
  - Time limit
- Use a **visible countdown timer**

Seating Assumptions

- "Turn to the person next to you" (don't assign groups)
- Front/back or left/right partners work better than diagonal

Noise Management

- Keep RallyRobin to **1–3 minutes**
- Shorter = quieter and more focused

Equity Moves

- Explicitly state alternation
- Encourage writing responses during the exchange
- Normalize pauses: "Thinking time counts as a turn"

Instructor Role

- Circulate briefly
- Listen for misconceptions
- Never try to hear *everyone*

Supporting Research

Rally Robin draws on well-established research bases:

- **Active learning** improves student performance and reduces failure rates in large classes (Freeman et al.).
- **Retrieval practice** strengthens long-term learning (Roediger & Karpicke).
- **Structured peer interaction** outperforms unstructured discussion in large settings.
- **Equal participation structures** reduce gender and status-based dominance.
- **Peer explanation** improves conceptual understanding even when peers are imperfect.

Importantly, **structure—not novelty—is the learning driver**, especially at scale.

Combining Rally Robin with Other Active Learning Strategies (Large-Class Specific)

A. RallyRobin → Polling

Flow

1. RallyRobin (generate ideas)
2. Individual poll (commit to answer)
3. Instructor debrief

Why it works

- Idea generation → individual accountability
- Reduces guessing

B. Think → RallyRobin → Share (Modified Think–Pair–Share)

- Think individually (30 sec)
- RallyRobin (90 sec)
- Call on **sections or rows**, not volunteers

C. RallyRobin → Numbered Heads Together

- Pairs join another pair
- Consolidate answers
- One number called for response

D. RallyRobin as Exam Scaffolding

- Before practice problems: RallyRobin on *strategies*
- After problems: RallyRobin on *errors or misconceptions*

E. RallyRobin + Minute Paper

- RallyRobin generates ideas
- Students individually write the **best one**
- Submit as exit ticket

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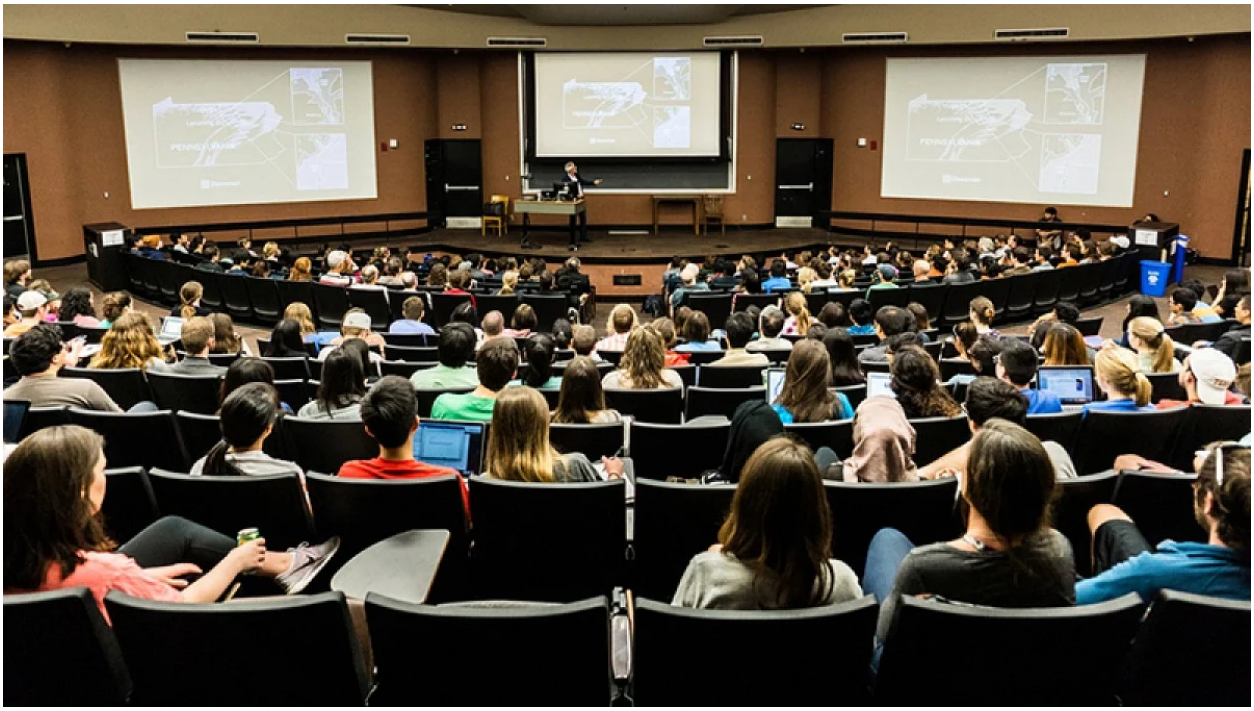
Numbered Heads Together



Use Cases

Numbered Heads Together (NHT) is a structured cooperative learning strategy in which:

1. Students are placed in small teams (often 4).
2. Each member gets a *number* (e.g., 1–4).
3. The instructor poses a question and gives time for teams to *put their heads together,* discuss, and ensure *everyone understands* the best answer.
4. The instructor calls a number; all students with that number respond — representing their team's answer.

NHT can be used at scale in large lecture courses in *any discipline*:

Formative assessment — quick checks for understanding during lecture pauses.
Concept Review & Recall — before exams/assessments.
Discussion starter — getting students thinking before group analysis or larger whole-class discourse.
Peer teaching & disciplinary dialogue — student explanations, not just teacher monologue.
Inclusive engagement — quieter students get practice speaking in smaller forums first.

In a class of 100+, organize groups *by row or small clusters* and use clicker cards or whiteboards for simultaneous responses to keep the process moving.

Video Link to Strategy

Here's a representative video demonstrating the basics of NHT:

https://www.youtube.com/watch?v=nTgbCrvWQ2Y

Rubrics

Rubric for NHT Participation

You can assess NHT using a **simple rubric** (adaptable to LMS scoring):

Criteria	4	3	2
Preparation	Student clearly knew the content	Mostly confident	Limited understanding
Group Discussion Contribution	Shared ideas/guided peers	Some input	Minimal impact
Accuracy of Response	Correct & well-justified	Mostly correct	Partial
Communication Skills	Clear & engaging	Understandable	Hard to follow

Why use a rubric?

- Adds transparency.
- Supports peer accountability.
- Allows formative scoring even when randomly selected.
  (*Adapted from general cooperative learning assessment practices.*)

Unique Grading Approaches for Large Classes

Alternative Grading Models

Points per group response accuracy — group earns 1–3 points; individual students get participation credit.
Improvement-based scoring — groups gain extra points for improvement over previous sessions (lowers competition).
clicker integration — combine individual clicker answers with group consensus work.

In large classes, grading can be quick (rubric + rubrics uploaded to LMS + TA support).

Scripting: How to Explain Numbered Heads Together to 100+ Students

Here's how to *explain NHT quickly* to 100+ students:

"Today we're using Numbered Heads Together — a cooperative learning strategy. I'll assign you to teams of 4 and label each of you as #1–#4. I'll ask a question, you'll discuss with your group so everyone knows the answer. Then I call a number (like 'All #2s'), and those students will share your group's agreed answer. The goal is for everyone to be ready — we're building understanding together, not just listening to me."

Key reminders to students:

- **Be ready — you *might* be called.**
- **Discuss — everyone has responsibility.**
- **Listen — and support peers to understand.**
- **Be respectful during sharing.**

Pro tip: **Use timers and whiteboards so responses fire quickly in a large class**

Best Practices (Large Class Specific)

Group logistics

- **Pre-assign teams with *mixed abilities* or rotate groups weekly.**
- **Use physical numbering (color cards, stickers, laminated number sets) so you don't lose time.**

Time management

- **Keep NHT cycles short (3–6 min) — essential when class is big.**
- **Use TAs or peer leaders for *facilitator support*.**

Technology integration

- **Combine with clicker questions post-discussion to validate group consensus.**
- **Upload group answers to LMS discussion boards.**

Classroom space

- **Cluster seating arrangements encourage conversation even in large lecture halls.**

Supporting Research

Although much research on NHT is in K–12 settings, **studies show strong support** for its academic impact, collaborative learning benefits, and higher achievement compared to traditional whole-class Q&A. For example:

- Cooperative learning (including NHT) fosters *positive interdependence, individual accountability, and social skills* crucial for learning.
- NHT is associated with **improved student outcomes and engagement** relative to lecture alone (*SUNY research reported increased test scores when using NHT vs. traditional instruction*).

For large STEM and lecture courses, evidence suggests active learning approaches like NHT **increase engagement and comprehension** compared to passive lecture.

Combining Numbered Heads Together with Other Active Learning Strategies (Large-Class Specific)

Pair with:

Think-Pair-Share — first individual thought, then NHT group consensus.
Flipped Classroom — assign pre-lecture content; use NHT in class to deepen analysis.
Peer Instruction (clickers) — use clicker questions *after* group consensus to evaluate understanding.
Gallery Walk / Jigsaw — after initial NHT consensus, rotate to share deeper insights.

Large class synergy: start with NHT to *activate prior knowledge*, then expand to larger discussions or application problems.

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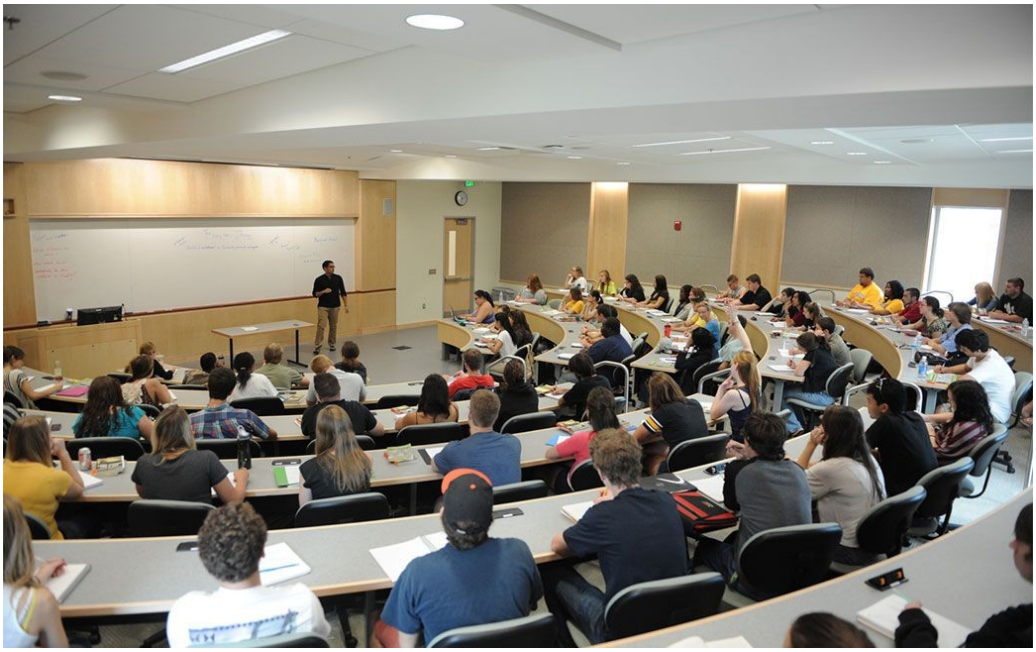
Minute Paper



Use Cases

A Minute Paper (also called *One-Minute Paper*) is a quick, reflective, written response that students complete during or at the end of class in response to a thought-provoking prompt. It's a formative assessment and active learning tool that helps students *synthesize learning* and gives instructors rapid feedback on comprehension.

Typical prompts (in <1–5 minutes):

- ***What was the most important thing you learned today?***
- ***What question remains unanswered?***
- ***What concept do you still find confusing?***

It's especially well-suited for large lecture classes because it is quick to administer, easy to adapt to digital tools (LMS or polling), and can capture feedback from all students simultaneously.

Minute Papers serve multiple teaching and learning purposes:

Formative assessment — check student grasp of concepts right after discussion.
End-of-class wrap-up — summarizing key points enhances retention.
Identify misconceptions — student responses highlight areas needing review.
Engage all students — every student writes a response (not just a few voices).
Promote reflection — students articulate their own understanding and gaps.

In large classes, you can collect responses via half-sheets, index cards, LMS text entries, or quick polls, making it scalable.

Video Link to Strategy:

A basic demonstration of how instructors implement the Minute Paper as a formative assessment in a classroom setting.

https://www.youtube.com/watch?v=L31EmEMXyMQ

Rubrics

Minute Papers are most often **low-stakes or ungraded** because their primary role is feedback—but you *can* include them in participation grading.

Example Rubric (Adapted for Large Classes)

Criteria	0 pts	1 pt (Needs Work)	2 pts (Acceptable)
Clarity of Key Idea	No clear idea	Very vague	Main point identifiable
Understanding of Concept	Misunderstands	Partial grasp	Good understanding
Question/Reflection Quality	None	Minimal reflection	Thoughtful gap identification

You could scale this rubric simply (e.g., 0–3 per student) and ***automatically grade*** through LMS tools or quick TA support, even in large classes

Unique Grading Approaches for Large Classes

Alternative grading practices for large classes:

- Participation points **for submitting the Minute Paper.**
- Random sampled feedback **— grade only a subset each session.**
- Anonymous feedback **used for class improvement instead of individual grading.**

Scripting: How to Explain Minute Paper to 100+ Students

Here's a script you can read to students:

"Today at the end of class, we're going to do a Minute Paper — a quick reflective writing activity. I'll show you a prompt, you'll have 1–3 minutes to write your thoughts. This helps you think about what you learned *and* helps me see how well the class is understanding the material. Your responses are low-stakes and may count toward participation. Please write clearly and be honest — your response helps shape future class discussions."

Key talking points to include:

- It's quick (1–5 minutes).
- Everyone participates — not just volunteers.
- Your goal is reflection *and* communication, not perfection.
- Instructor will use responses to tailor next class.

Best Practices (Large Class Specific)

Time management

- Reserve time in class agenda ahead of time.
- Use LMS or polling tools to expedite collection and review.

Prompt design

- Ask questions tied to *learning outcomes*.
- Vary prompts to reduce fatigue (e.g., some weeks ask "key learning," others "remaining questions").

Logistics

- Use technology (Google Forms, LMS, Poll Everywhere, Mentimeter) for digital submission.
- If using paper, have TAs assist with collection/quick scanning.

Feedback loop

- Share *class trends* next session (common confusions or strong insights).
- Address unresolved questions in follow-up.

Supporting Research

Minute Papers are one of the **most widely used classroom assessment techniques** in higher education because they give **rapid feedback on learning**.

Research indicates minute papers can **increase student engagement, reduce anxiety, and deepen learning** when used purposefully.

When used **regularly (e.g., weekly)** rather than daily, they remain effective without becoming repetitive.

Thomas A. Angelo & K. Patricia Cross — *Classroom Assessment Techniques: A Handbook for College Teachers*(1993). This foundational handbook notes that the **Minute Paper is one of the most frequently used CATs in college teaching** because it provides *quick and useful feedback* on student learning.

David R. Stead (2005) — *A Review of the One-Minute Paper* (Active Learning in Higher Education). This review summarizes literature showing the Minute Paper's benefits for students and teachers and reports that students generally perceive the technique *favorably*, which is linked with enhanced engagement and learning outcomes.

Chiou, C., Wang, Y., & Lee, L. (2014) — Study cited in teaching resources that finds the One-Minute strategy *reduces statistical anxiety* and *enhances learning achievement*.

Stead (2005) — the same review notes that using minute papers *weekly rather than daily* helps maintain effectiveness without becoming repetitive, based on perceived decreases in response quantity when overused.

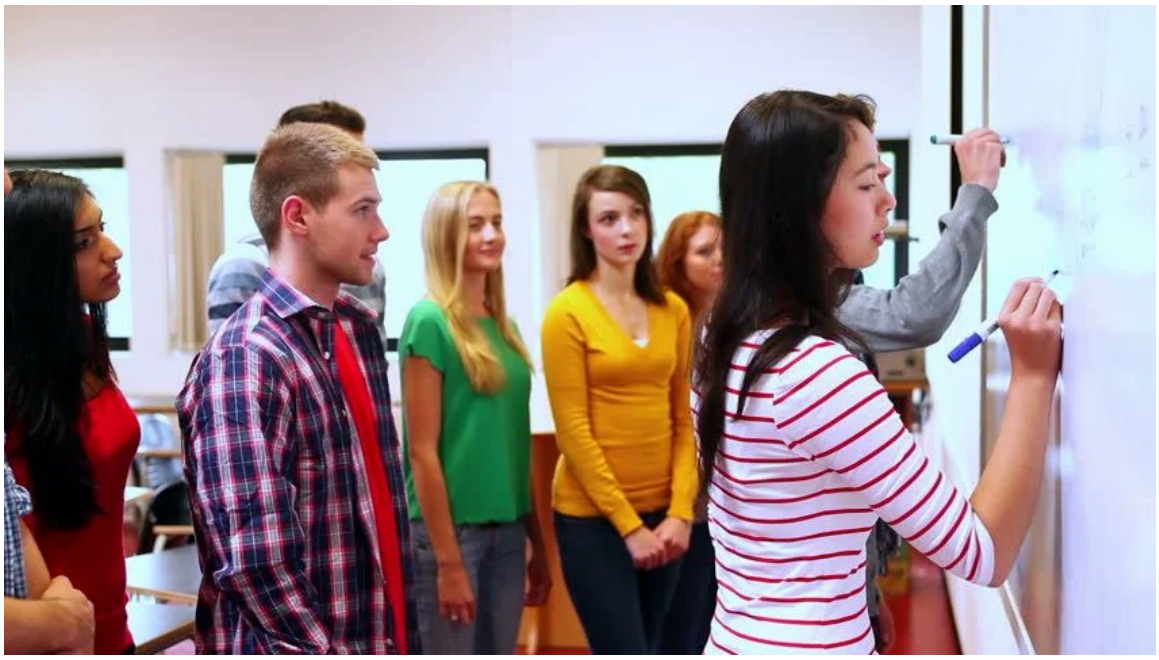
Combining Minute Paper with Other Active Learning Strategies (Large-Class Specific)

Minute Papers play well with other techniques:

Think-Pair-Share + Minute Paper
Have students write a minute paper, then discuss in pairs before sharing highlights.
Polling + Minute Paper
Use a clicker or poll for a quick quantitative check, *then* minute paper for qualitative reflection.
Flipped Classroom + Minute Paper
Assign reading before class and use minute papers to see what students learned or are confused about.
Exit Ticket Rotation
Use minute papers as exit tickets, then quickly review aggregate results before next lecture.

This blend keeps large classes *active* without overwhelming instructor or students.

Gallery Walk



Use Cases

What a Gallery Walk Looks Like at Scale

Students work in pairs or small groups to generate responses to prompts posted around the room (physical posters or digital stations). Groups rotate, analyze others' work, and add comments, critiques, or extensions. The instructor curates synthesis rather than calling on individuals.

A. Concept Check / Clarification

After introducing a complex theory, equation, or framework:

Gallery Walk Flow

- Create: Groups write an explanation, diagram, or worked example on a poster or shared slide.
- Circulate: Groups rotate to 2–4 stations, comparing interpretations.
- Annotate: Students add sticky notes or digital comments identifying:
    - Confusions
    - Agreements
    - Alternative explanations
- Synthesize: Instructor highlights patterns and addresses misconceptions.

Best for: Threshold concepts, abstract models, theoretical frameworks.

B. Solving Discipline-Specific Problems (Highly Effective in STEM)

Examples

- Analyze a dataset and post conclusions
- Sketch and interpret graphs
- Walk through steps of a chemical reaction
- Diagnose a case (nursing, psychology, business)
- Map sociological or economic patterns

Gallery Walk Advantage in Large Classes

- Multiple solution paths are visible simultaneously.
- Students learn by *critiquing*, not just producing answers.

C. Debates in Humanities & Social Sciences

Station Prompts

- Ethical dilemma (philosophy)
- Policy critique (public administration)
- Competing interpretations of a text or primary source (history, English)

Rotation Task

- Station 1: Identify strongest claim
- Station 2: Add counterargument
- Station 3: Add evidence or real-world example

This structure scales debate without needing verbal discussion from every student.

D. Application of Theory to Practice

Gallery Walk Design

Each station represents a real-world scenario:

- Leadership conflict
- Media artifact
- Economic event
- Organizational problem

Groups apply the same theory to *different contexts*, then rotate to compare how theory behaves across cases.

E. Pre-Exam Review / Retrieval Practice

Exam-Style Stations

- Concept explanation
- Problem-solving question
- Common misconception
- “Explain why this answer is wrong”

Students rotate, check reasoning, and add solution strategies—excellent for large-section exam prep.

Video Link to Strategy

Here's a representative video demonstrating the basics of a Gallery Walk:

https://youtu.be/IJTi51JXiRU

Rubrics

Participation Rubric (0–3 points per Gallery Walk)

Criteria	Points	Description
Contribution	0–1	Group posts a complete response at assigned station
Engagement	0–1	Adds comments/questions to at least one other station
Synthesis	0–1	Submits brief takeaway or reflection

Reflection Rubric (Short Post-Walk Reflection, 0–4)

Criteria	Points
Conceptual accuracy	0–1
Quality of comparison across stations	0–1
Integration of another group's idea	0–1
Question or insight for deeper discussion	0–1

Unique Grading Approaches for Large Classes

A. Micro-Grades

1–2 points per Gallery Walk. High frequency, low stakes.

B. Completion-Only Tracking

Tracked via:

- QR code at exit
- LMS “I participated” check
- Photo upload of group poster

C. Station Rotation Grading

Only **one station per class session** is graded in depth. Students don’t know which in advance.

D. Random Group Audit

Instructor or TAs grade 10–15% of groups; score applies to all.

E. Self-Report + Evidence

Students submit:

- “I contributed to my group’s station.”
- “I commented on at least one other station.”
  Paired with random verification.

Scripting: How to Explain Gallery Walk to 100+ Students

Intro Script

"Today we're using a Gallery Walk. You'll work in small groups to create a response at one station, then rotate to see how other groups approached the same or related problems. Your job isn't just to look—it's to *analyze, compare, and add value*. You'll learn as much from others' thinking as your own."

Transition Script

"When the timer sounds, rotate clockwise to the next station.
Read carefully. Add a question, connection, or improvement—don't erase others' work."

Synthesis Script

"I'm seeing three dominant approaches across the room. Let's talk about why these differences matter and which reasoning is strongest."

Assessment Script

"Before you leave, submit a two-sentence takeaway identifying one idea you borrowed from another group."

Best Practices (Large Class Specific)

A. Control Movement

- Rotate only **half the room at a time**
- Use clear arrows or numbered stations

B. Use Pairs or Triads

Smaller groups = fewer posters, less congestion.

C. Digital + Physical Hybrid

- Posters for creation
- LMS form or Padlet for comments
  This reduces crowding and preserves work.

D. High-Quality Prompts Are Essential

Use prompts that demand:

- Justification
- Comparison
- Evaluation
  Avoid factual recall.

E. Norms Training (Week 1)

Explicitly teach:

- How to comment constructively
- How to disagree respectfully
- What counts as “value-added” feedback

Supporting Research

Gallery Walks operationalize all of these principles at scale:

- **Freeman et al. (2014)** – Active learning improves exam performance in large STEM courses
- **Prince (2004)** – Peer interaction enhances conceptual understanding
- **Johnson & Johnson (2009)** – Structured collaboration improves achievement
- **Crouch & Mazur (2001)** – Learning improves when students explain and critique reasoning
- **Bruff (2009)** – Visible thinking + peer comparison boosts gains in large lectures

Combining Gallery Walk with Other Active Learning Strategies (Large-Class Specific)

A. Gallery Walk + Clickers

Vote → Walk → Vote again (tracks conceptual change)

B. Gallery Walk + Jigsaw

Each station = one "expert" component
Students rotate, then regroup to synthesize.

C. TPS → Gallery Walk (Power Combo for 100+)

- Think individually
- Pair to draft
- Post and rotate

This keeps cognitive load manageable in large rooms.

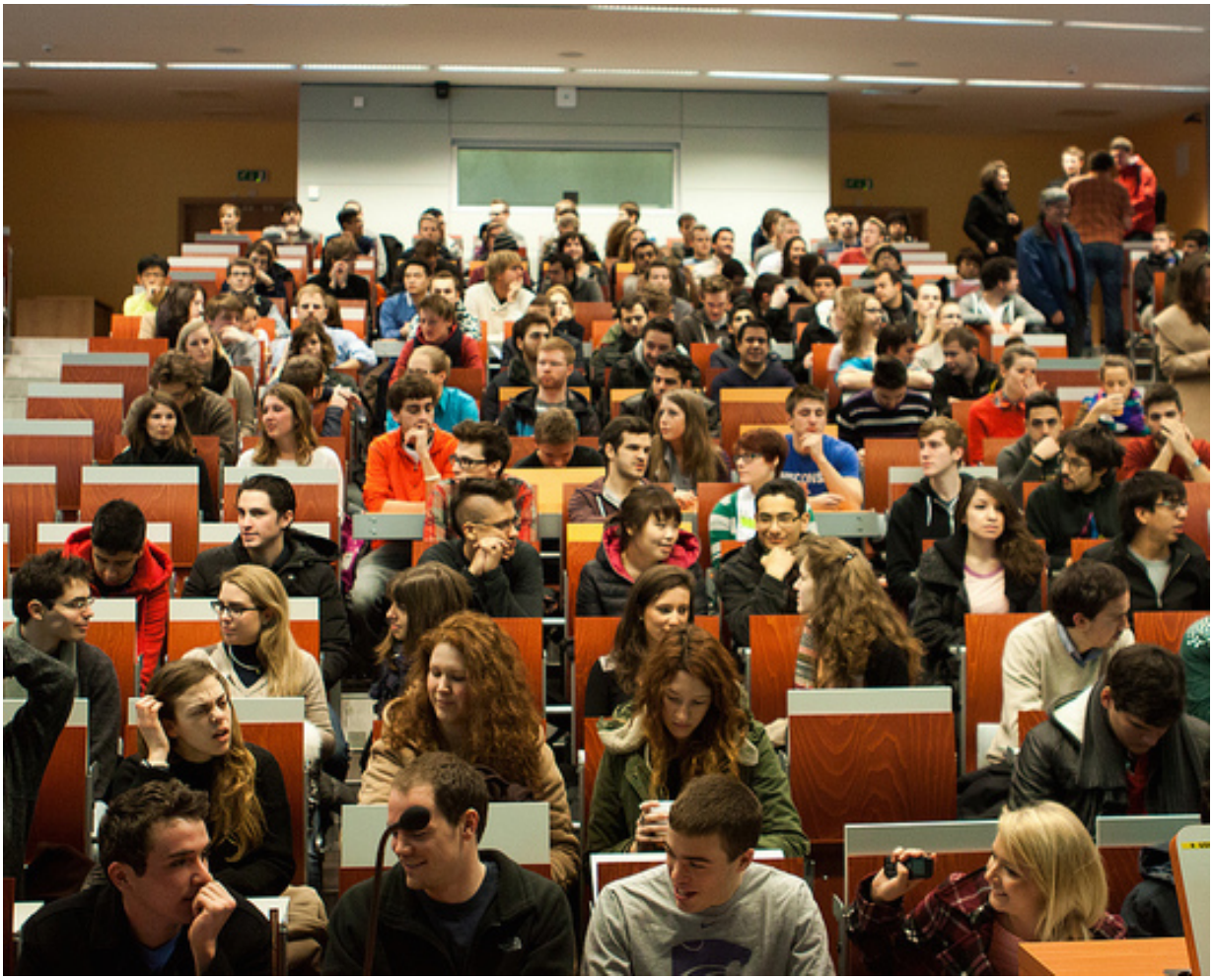
D. Gallery Walk + Debate

Stations represent positions.
Groups must *strengthen opposing arguments* when rotating.

E. Gallery Walk + Reflection Journals

Prompt:

- "Which station most challenged your thinking?"
- "What did another group do better than yours?"



Cooperative Group Structures

Team-Based Learning

Core Design Principles (Why TBL Works at Scale)

TBL is built on four essential principles that directly address large-class challenges:

1. **Permanent, strategically formed teams**
2. **Individual and team accountability**
3. **Immediate feedback**
4. **Application-focused learning**

Unlike informal group work, **TBL replaces much of traditional lecture while *reducing* grading load.**

Team Formation (Critical for Success)

Team Size

- 5–7 students per team (ideal for 100+ classes)
- **Example:**
    - 120 students → ~20 teams of 6

Formation Method (Instructor-Assigned)

Teams should be heterogeneous, not self-selected.

Common criteria:

- Academic background / major
- Prior coursework or experience
- GPA bands or diagnostic quiz results
- Demographics relevant to the discipline (when appropriate)

Best Practice:

- **Rank students** by a key variable and distribute evenly across teams.

Duration

- **Teams** remain permanent for the entire term (or at least 6–8 weeks).

Readiness Assurance Process (RAP)

This is the backbone of TBL and ensures preparation.

Step 1: Pre-Class Preparation

- Readings, videos, or mini lectures
- Narrowly focused (30–60 minutes max)
- Clear learning objectives provided

Team Roles

While not required, roles improve efficiency in large classes.

Common Roles:

- **Facilitator** – keeps discussion focused
- **Recorder** – documents decisions
- **Reporter** – submits or announces answer
- **Skeptic** – challenges reasoning
- **Timekeeper** – monitors pacing

Rotation: Weekly or per unit.

Individual Readiness Assurance Test (iRAT)

Purpose:
Ensures *individual accountability* and incentivizes pre-class preparation.

Key Features:

- Short quiz (typically 5–10 multiple-choice questions)
- Taken individually at the start of class
- Closed book (unless discipline-appropriate)
- Low-stakes but meaningful portion of course grade

Why it works at scale:

- Auto-gradable (LMS or scan forms)
- Prevents social loafing
- Creates cognitive tension before team discussion

Team Readiness Assurance Test (tRAT)

Purpose:
Promotes *team accountability* and deepens understanding through peer instruction.

Key Features:

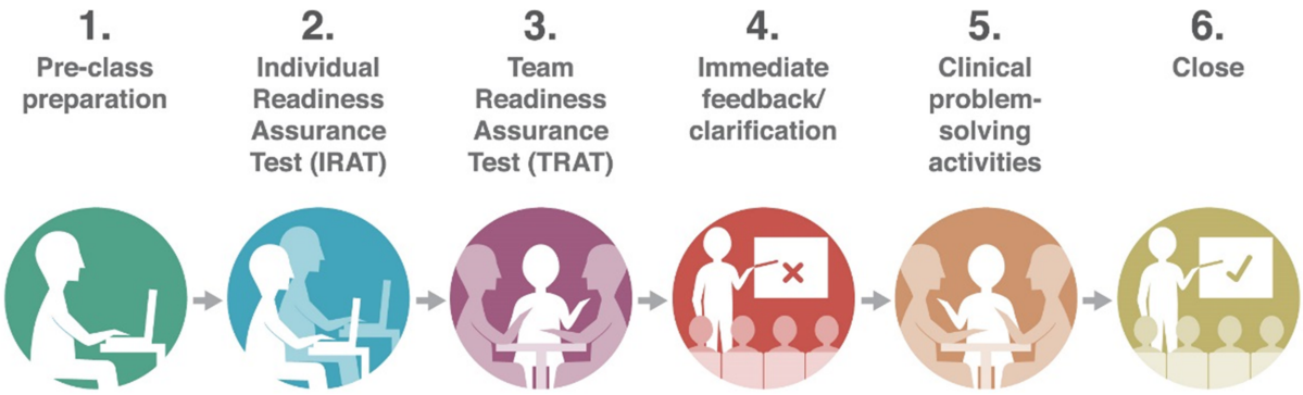
- Same questions as the iRAT
- Completed immediately after, in permanent teams
- Teams must agree on one answer

Feedback Mechanism:

- Immediate feedback using:
    - IF-AT scratch cards (classic TBL)
    - LMS tools with instant reveal
- Partial credit possible for second attempts (optional)

Why it works at scale:

- One submission per team → dramatically reduced grading
- High-energy discussion even in large lecture halls
- Immediate feedback corrects misconceptions on the spot



Team Based Learning Assignments/Projects:

Case-Based Decision Brief

What students do:
Teams analyze a realistic case and submit a one-page decision brief recommending a course of action.

Deliverable:

- Chosen option (forced choice)
- 2–3 pieces of evidence
- One risk or limitation

Why it fits TBL:

- Significant problem
- Specific choice
- Same case for all teams

Scales well because:

- Short, standardized format
- Easy rubric
- Team submission

Best-Option Ranking Task

What students do:
Teams rank-order 4–6 possible solutions to a problem and justify their top choice.

Deliverable:

- Ranked list
- 2-sentence justification for #1

Why it fits TBL:

- Forces comparison and consensus
- Encourages higher-order thinking

Scales well because:

- Identical problem across teams
- Can be graded for completion or spot-checked

Data Interpretation Challenge

What students do:
Teams analyze a shared dataset, graph, or table and select the most defensible interpretation.

Deliverable:

- Selected interpretation (A–D)
- One supporting data point

Why it fits TBL:

- Decision-based
- Immediate feedback possible

Scales well because:

- Auto-graded choice + short justification

Station Rotation

Station Rotation is a structured active-learning model where students work in **small groups** that rotate through **multiple stations**, each designed for a different learning purpose.

In large higher-ed classes, it typically includes:

- **Content station** (concept clarification)
- **Application station** (problem solving / case work)
- **Feedback or assessment station** (quiz, peer review)
- **Instructor-facilitated station** (optional, staggered)

Not every class needs all four.

Why Station Rotation Works at Scale

For 100+ students, station rotation:

- Breaks cognitive overload of long lectures
- Allows **simultaneous engagement**
- Supports **differentiation** (not all learning looks the same)
- Reduces whole-class management problems
- Keeps instructor workload manageable

Grouping Structure

Group Size

- **4–6 students per group** (sweet spot for movement + discussion)

Number of Groups

- 100 students → ~20 groups of 5

Group Stability

- Keep groups **consistent for the entire class session**
- Can be permanent for a unit or rotating weekly

Roles (Strongly Recommended)

Assign **simple Kagan-style roles** to keep groups efficient

- Facilitator (keeps group on task)
- Recorder (documents work)
- Timekeeper (monitors station time)
- Reporter (shares results if needed)
- Tech Manager (if digital tools used)

Station Design (Higher-Ed Appropriate)

Below is a **4-station model** that works especially well in large classes.

Station 1: Concept Clarification (Low Instructor Load)

Purpose: Reinforce key ideas from pre-class prep

Activities:

- Short concept questions
- Worked examples with prompts
- "Identify the error" tasks

Format:

- Printed handout or LMS module
- Self-paced but time-bounded

Accountability:

- Completion check
- Short quiz item

Station 2: Application / Problem Solving

Purpose: Deep learning through use of concepts

Activities:

- Case study
- Scenario-based decision
- Data interpretation

Format:

- One shared problem for all groups
- Forced choice or ranking

Accountability:

- Group submission
- Random spokesperson

Station 3: Feedback / Assessment

Purpose: Immediate formative feedback

Activities:

- Low-stakes quiz
- Peer review checklist
- Answer-key comparison

Format:

- LMS quiz or QR code
- Auto-graded when possible

Accountability:

- Individual score
- Participation credit

Station 4: Instructor-Facilitated (Optional but Powerful)

Purpose: Target misconceptions and deeper questions

Activities:

- Mini-discussion
- Think-aloud problem solving
- Q&A

Format:

- Instructor stays in one location
- Groups rotate through over time

Accountability:

- Attendance check
- Reflection question afterward

Timing Models for 100+ Classes

Example: 75-Minute Class

Time	Activity
0–5 min	Instructions & group setup
5–20 min	Rotation 1
20–35 min	Rotation 2
35–50 min	Rotation 3
50–65 min	Rotation 4
65–75 min	Whole-class synthesis

Key Tip: Use **visible timers** and audio cues.

Physical & Digital Layout Strategies

Fixed Seating Lecture Halls

- Stations are **conceptual**, not physical

- Rotation happens via:
    - Slide prompts
    - LMS modules
    - QR codes

Flexible Classrooms

- Physical movement encouraged
- Clear signage and color coding

Online / Hybrid Adaptation

- Breakout rooms as stations
- Timed LMS modules
- Shared docs for artifacts

Common Pitfalls (and Fixes)

Pitfall	Fix
Chaos during movement	Use conceptual rotations
Unequal participation	Assign roles
Running out of time	Fewer stations (3 max)
Instructor overload	Automate one station
Superficial work	Use forced-choice tasks

Accountability in Large Classes

Station rotation fails without accountability.

Use a Triple-Layer System:

1. **Individual** (quiz, reflection)
2. **Group** (artifact or decision)
3. **Random reporting** (cold call or poll)

Peer Instruction (Mazur Model)

Peer Instruction shifts class time from *telling* to *thinking and explaining*.

Students:

1. Answer a **conceptual question individually**
2. See aggregate results
3. **Discuss with peers** (trying to convince each other)
4. Re-answer the same question
5. Learn from targeted instructor explanation

This works at scale because **every student participates simultaneously**.

Class Flow (Typical PI Cycle)

A single PI cycle takes **6–12 minutes** and can be repeated multiple times per class.

Step-by-Step (Large-Class Timing)

1. **Mini-lecture (5–10 min)**
    - Introduce or review one core concept
    - No full derivations or long explanations

2. **Concept Question (ConcepTest)**
    - Multiple choice (A–D or A–E)
    - Designed to reveal misconceptions

3. **Individual Vote (1–2 min)**
    - Students answer independently
    - Use clickers, polling, or LMS

4. **Peer Discussion (2–4 min)**
    - Students turn to neighbors
    - Must justify and defend their choice

5. **Revote (1 min)**
    - Students answer again
6. **Instructor Explanation (2–5 min)**
    - Focus on why wrong answers are tempting
    - Build directly on student reasoning

Question Design (Most Important Element)

What Makes a Strong ConcepTest

Good PI questions are:

- **Conceptual**, not computational
- **Predictive or explanatory**
- Have **plausible distractors** tied to common misconceptions
- Answerable in <2 minutes individually

Example (Non-Discipline Specific)

If variable X increases while Y is held constant, what happens to Z?

- A. Increases linearly
- B. Increases non-linearly
- C. Decreases
- D. Remains unchanged

Each wrong option reflects a common error.

Grouping & Seating in 100+ Classes

Group Size

- **2–3 students** (best)
- Occasionally 4 if seating requires

Seating Constraints

- Fixed lecture halls work well
- Students talk to immediate neighbors
- No formal group formation required

Accountability (Without Heavy Grading)

Individual Accountability

- Participation points for voting
- Correctness can be low-stakes or bonus

Peer Accountability

- Students must *explain* their reasoning
- Instructor circulates and listens

Best Practice

- Grade **participation, not accuracy**
- Emphasize learning over performance

Technology Options (Scalable)

Polling Tools

- Clickers
- LMS quizzes
- Web-based polling (Mentimeter, Poll Everywhere)

Display

- Show **aggregate results only**, not correct answer
- Use bar charts to spark discussion

Instructor's Role During Peer Discussion

Instead of lecturing, the instructor:

- Walks the room
- Listens for misconceptions
- Asks probing questions
- Chooses which reasoning to highlight

In large classes, this is **more impactful than calling on volunteers**.

Instructor Explanation (What to Emphasize)

After the revote:

- Address *why* each distractor is tempting
- Connect student explanations to formal language
- Keep explanations short and targeted

Avoid:

- Re-lecturing the entire concept
- Saying "most of you got it wrong"

Assessment Alignment

Peer Instruction pairs well with:

- Conceptual exam questions
- Short-answer explanations
- Justification-based MC items

Best alignment:

Use **exam questions similar in structure** to ConcepTests.

Common Pitfalls (and Fixes)

Pitfall	Fix
Questions too easy	Use misconception-based distractors
Silence during discussion	Require justification, not answers
Over-lecturing	Trust the vote data
Students gaming polls	Grade participation only
Too many questions 3	3–6 PI cycles per class max

Evidence of Effectiveness (High-Level)

Research consistently shows that PI:

- Improves conceptual understanding
- Reduces achievement gaps
- Increases engagement in large classes
- Works across STEM, social sciences, and humanities

(Especially powerful in **introductory gateway courses**.)

Example 75-Minute PI Class (100+ Students)

Time	Activity
0–10	Mini lecture
10–20	PI Cycle 1
20–30	Mini lecture
30–40	PI Cycle 2
40–50	PI Cycle 3
50–65	Application example
65–75	Summary + exit question

When Peer Instruction Is the Best Choice

Use PI when your goals are to:

- Correct misconceptions
- Build conceptual understanding
- Increase engagement without complex logistics
- Maintain control in very large lectures

Kagan-Base Team Structure

Key principles

- **Positive interdependence** – students need each other to succeed
- **Individual accountability** – no free riders
- **Equal participation** – everyone has a role or voice
- **Simultaneous interaction** – many students engaged at once

In higher ed, this usually becomes:

Stable, purposefully designed teams of 3–5 students that work together repeatedly across low-stakes and high-stakes tasks.

Team Formation Strategy for 100+ Students

Optimal Team Size

- **4 students per team** (ideal)
- 3 works if space is tight; 5 only if necessary

How to Form Teams (Practical Options)

Best practice for large classes:

- Instructor-assigned teams during weeks 1–2
- Balance for:
    - Major/discipline (if relevant)
    - Year/experience level
    - Skill diversity (writing, quantitative, leadership)

Efficient methods:

- LMS survey → auto-sort
- Alphabetical seating blocks
- Pre-assigned table numbers or Zoom breakout rooms

Keep teams stable for 4–8 weeks minimum to build trust and efficiency.

Team-Based Application Assignments (Low Grading Load)

Example: Case Snapshot

- Teams analyze a short case
- Deliverable:
    - 1 slide
    - 250-word response
    - 5-question quiz created by the team

Grading:

- Completion + spot-check depth
- Rubric-based, fast to grade

Team Exams / Exam Wrappers

Structure:

1. Individual exam
2. Same exam taken again as a team
3. Team score = % of final grade (e.g., 15–25%)

Benefits:

- Strong learning gains
- Reduces test anxiety
- Encourages peer teaching

Rotating Role Projects (Very Kagan-Aligned)

Each assignment includes **rotating roles**, such as:

- Facilitator
- Evidence Checker
- Skeptic / Devil's Advocate
- Synthesizer

Works for:

- Research proposals
- Design projects
- Policy briefs

Accountability tool:

- Short individual reflection (graded lightly)

Team Discussion Deliverables (Better Than Forums)

Instead of 100+ discussion posts:

- Teams submit **one collective post**
- Each student adds a required annotation or citation
- Random member defends it in class or online

Peer Instruction Micro-Presentations

- Teams create:
    - 3–5 minute explanation video
    - Infographic
    - Concept map

Numbered Roles

What "Numbered Roles" Means in Higher Ed

Numbered Roles combine two ideas:

1. **Stable teams** (3–5 students)
2. **Rotating, numbered responsibilities** that align with cognitive tasks—not just logistics

Each student has a **number (1–4)** and an associated **role** *for that class session or assignment*.

The number is what allows **random accountability**; the role is what guarantees **equal participation**.

Team Formation & Numbering (100+ Students)

Team Size

- **4 students per team** is ideal
- If needed:
    - Teams of 3 → roles 1–3
    - Teams of 5 → add a "Connector" role

How to Assign Numbers

- Permanent team numbers for 4–6 weeks
- Roles rotate **every class or every assignment**
- Display role chart on slides or LMS

Example numbering:

- Student A = #1
- Student B = #2
- Student C = #3
- Student D = #4

High-Impact Numbered Roles (Cognitively Meaningful)

Avoid “timekeeper” or “note-taker” only roles. In higher ed, roles should map to **thinking tasks**.

Core Role Set (Works Across Disciplines)

Number	Role	Cognitive Function
#1	**Summarizer**	Synthesizes key ideas
#2	**Evidence Finder**	Locates data, citations, proof
#3	**Analyzer / Skeptic**	Challenges assumptions
#4	**Applicator / Connector**	Applies to real-world or new case

Core Numbered Role Structures for Large Classes

Numbered Roles + Think–Team–Call

Flow:

1. Individual think/write
2. Team discussion with roles active
3. Instructor randomly calls a number
4. That role reports for the team

Works well for:

- Conceptual understanding
- Ethical reasoning
- Case interpretation

Scaling tip:

- Responses via polling, short answer LMS, or cold-call by section

Assignments That Work Extremely Well (100+ Students)

A. Numbered Role Case Analysis (Low Grading Load)

Deliverable:

- 1–2 page team memo

Required sections (mapped to roles):

- Summary (#1)
- Evidence (#2)
- Limitations / Counterarguments (#3)
- Application / Recommendation (#4)

Grading trick:

- Grade only one randomly selected section in depth

B. Numbered Role Exams (Very Powerful)

Structure:

1. Individual exam
2. Team exam using roles
3. Instructor calls random numbers to justify answers

Why students buy in:

- Roles feel fair
- Free-riding is obvious and risky

C. Rotating Role Research Projects

Each milestone uses the same numbers but **different responsibilities**.

Example milestones:

- Proposal
- Annotated bibliography
- Draft
- Final presentation

Each student writes a **short individual justification** aligned to their role.

D. Discussion Replacement Assignments

Instead of 100 discussion posts:

- Teams submit **one post**
- Instructor calls a specific number to defend it

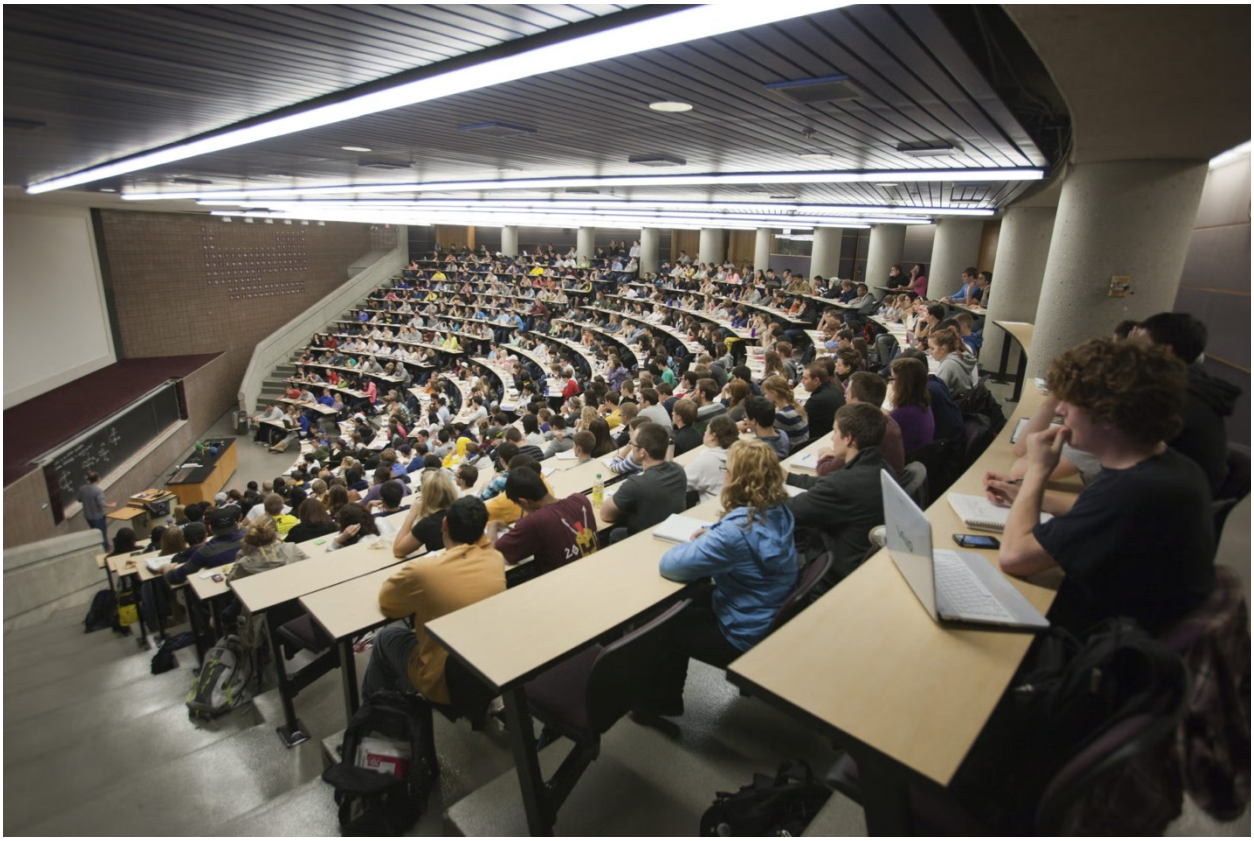
- Other roles must add:
    - Evidence
    - Critique
    - Application

E. Micro-Presentations with Numbered Speakers

- Each student speaks only from their role
- Order is random
- Total time: 3–5 minutes per team

This prevents:

- Dominators
- Scripted handoffs
- Unequal speaking time



Grading Strategies

Specifications (Specs) Grading — *Binary, Fast, Transparent*

What it is:

Assignments are graded **Pass / Revise / Not Yet**, based on clear criteria.

How it scales:

- No point-by-point decisions
- Rubrics become checklists
- Revisions replace re-grading debates

Best for:

- Writing assignments
- Problem sets
- Projects with multiple drafts

Example spec:

- Addresses prompt directly
- Uses 2 course sources
- Meets length and format requirements
- Demonstrates correct method

Meets all - Pass

Misses any – Revise

Time saver:

Cuts grading time by ~40–60% once students understand expectations.

Team-Based Grading with Individual Accountability

What it is:

Grade **one submission per team**, but protect fairness.

How it scales:

- 25 team submissions instead of 100 papers
- Individual accountability via:
    - Random oral defense
    - Individual quizzes
    - Role-based reflections

Best for:

- Case analyses
- Lab reports
- Design projects
- Exam wrappers

Anti–free rider tools:

- Peer evaluations
- Randomly selected section graded in depth
- Individual add-on questions

Auto-Graded + Human-Graded Hybrid

What it is:

Use auto-grading for *what machines do well* and reserve human grading for thinking.

Typical split:

- Auto-graded:
  - Reading checks
  - Concept quizzes
  - Calculation accuracy
- Human-graded:
  - Justifications
  - Applications
  - Reflections

Best for:

- STEM
- Intro social science
- Any content-heavy course

Time saver:

Auto-grading handles volume; you grade only **higher-order responses**.

Rubric Sampling (Selective Deep Grading)

What it is:

Grade **everything lightly**, but **one component deeply**.

How it works:

- Students complete a multi-part assignment
- Instructor randomly selects:
  - One question
  - One section
  - One role's contribution
- That portion is graded in depth

Why it works:

- Students must prepare all parts
- You grade ~25% of the work at full depth

Transparency tip:

Tell students *in advance* what will be sampled.

Exam Wrappers & Structured Reflection (Low Effort, High Insight)

What it is:

Short, structured reflections attached to major assessments.

Typical prompts (3–5 min):

- What type of errors did you make?
- What strategy worked?
- What will you change next time?

How it scales:

- Use checkboxes + one sentence
- Grade for completion or specs

Best for:

- Exams
- Major projects
- Midterm/final review

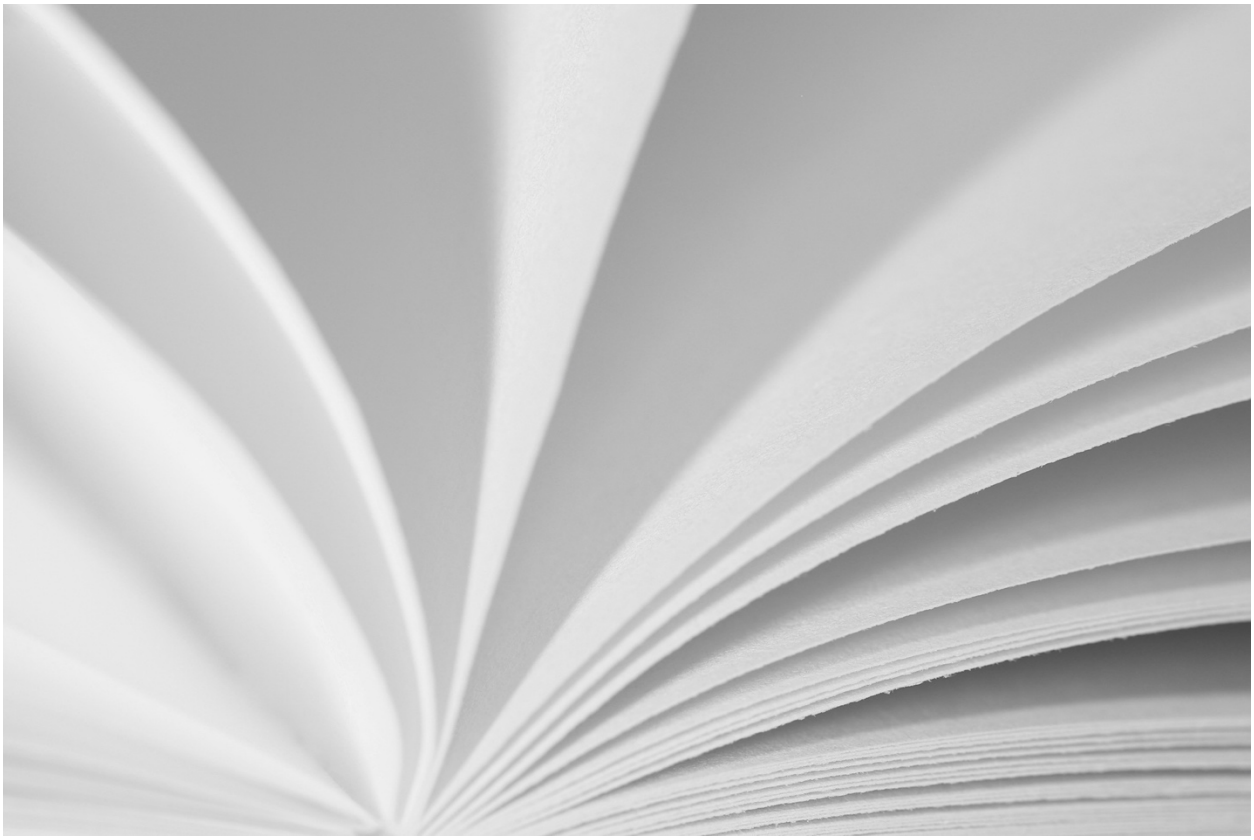
Bonus:

Improves learning without adding grading complexity.

Comparison Snapshot

Strategy	Grading Load	Rigor	Student Buy-In
Specs Grading	Very Low	High	High (after week 2)
Team-Based	Low	High	Medium–High
Auto + Human	Very Low	High	High
Rubric Sampling	Medium	High	High
Exam Wrappers	Very Low	Medium	Very High

UTEP InSPIRE



Resources

Active Learning Strategies for Large Classes (100+)

1. Teaching Large Classes in Higher Education: How to Maintain Quality with Reduced Resources. Higher Education Large Classes Support.

2. Teaching Large Online and Blended Classes. Tips for Teaching Large Classes (PDF)

3. Cornell Center for Teaching Innovation – Engagement strategies for large classes. Engaging Students in Large Courses (Cornell CTI)

4. University of Washington – Guide to teaching large enrollment courses & active learning. Teaching Large Enrollment Courses (UW Teaching)

5. Maverick Learning Pressbook – 10 active learning strategies for large lecture classes. 10 Strategies for Engaging Learners in Large Lecture Classes

6. University of Michigan CRLT – Teaching strategies to make lectures more participatory. Teaching Strategies: Large Classes and Lectures (CRLT)

7. Western Michigan University – Large lecture strategies focusing on active learning. Large Lecture: Active Learning (WMU)

8. Collegiate Active Learning Workshop – Berkeley active learning in large classes. Active Learning in Large Classes: What's Possible?

9. Cornell CTI – Engaging Students in Large Courses (duplicate source but different content emphasis). Engaging Students in Large Courses (Cornell CTI, another view)

10. Columbia CTL – Large course teaching & active engagement suggestions. Teaching Large Courses Effectively and Efficiently (Columbia CTL)

Grouping / Collaborative Structures for Large Classes

1. Tufts University – Fostering effective group work (roles, structure, clarity). Fostering Effective Group Work in College Classes (Tufts)

2. UMass Amherst – Structured small group work in large lectures. Power of Small Group Work in Large Classes (UMass)

3. Harvard Bok Center – Guide to group work and collaboration. Group Work Guide (Harvard Bok Center)

4. Wikipedia – Jigsaw teaching technique (adaptable to large classes). Jigsaw (teaching technique)

5. Wikipedia – Student teams-achievement divisions (STAD cooperative learning). Student teams-achievement divisions (STAD)

6. Michigan Cooperative Learning Structures (historic overview of complex structures). Complex Cooperative Learning Structures for College (Michigan)

7. COD Library – Group work and cooperative learning basics. Learning Activities: Group Work (COD Library)

8. Inside Higher Ed – Three ways to improve student group work success. 3 Ways to Improve Student Group Work (Inside Higher Ed)

9. Montclair State – Team-Based Learning (TBL) and collaborative active learning. Active Learning In Large Classes (Team-Based Learning section)

10. Northwestern Searle Center – Guide on making large classes feel smaller (includes group strategies). Making Large Classes Feel Smaller (Northwestern)

Grading & Assessment Structures for Large Classes

1. University of Colorado Boulder – Assessment strategies for large enrollment classes. Large Courses: Assessment (CUBoulder)

2. Caltech CTLO – Large class assessment & grading tips (rubrics, low-stakes). Teaching Large Classes (Caltech CTLO Grading)

3. Taylor Institute (U Calgary) – Alternative assessments in large classes. Alternative Assessment Strategies (Taylor Institute)

4. Western University – Grading strategies for managing workload. Grading Strategies (Western U)

5. Ohio State Teaching Resources – Streamlining grading & rubrics for large classes. Teaching Large Enrollment Courses (OSU)

6. Times Higher Education – Best practices for large-class grading quality control. All's Fair in Large-Class Grading (THE)

7. Northwestern Searle – Making large classes feel smaller with assessment strategies. Making Large Classes Feel Smaller (Assessment)

8. Elizabethtown College PDF – Grading tips for large classes. Good Teaching in Large Classes: Grading (PDF)

9. ARXIV Paper – Grading by category to speed exam feedback. Grading by Category for Large Courses (ARXIV)

10. ARXIV Paper – LLM framework for automatic assignment grading (research on AI grading support). Zero-Shot LLM Framework for Automatic Grading (ARXIV)