Collaborative Learning Pedagogy and Content Analysis Training

SPRING 2026 SYLLABUS

Key Information

- **Instructor:** Subhadip Chowdhury (he/him), subhadip@uchicago.edu, Eckhart 120B
- **Graduate TA:** Pranjal Warade, pwarade@uchicago.edu

Pedagogy Training	Friday	1:30 pm-2:20 pm	E 207A
Content Analysis Training	Monday	1:30 pm-3:20 pm	Ry 253B

Training Program Description and Learning Goals

The training program supports undergraduate Lead Junior Tutors (LJTs) and graduate Teaching Assistants (TAs) in the Collaborative Learning (CL) Tutorial program, which supplements the Elementary Functions and Calculus (Math 131-132-133) sequence in the Department of Mathematics. CL is a highly structured form of group work grounded in Process-Oriented Guided Inquiry Learning (POGIL): students work in small, self-managed teams on guided-inquiry materials, with clearly defined roles and an emphasis on both content learning and process skills (communication, teamwork, and metacognition).

Our shared goal is to use collaborative practices to deepen students' conceptual understanding, improve their ability to reason, communicate, and solve problems independently, and enhance their performance on homework and exams. As a Lead Junior Tutor, you will facilitate the process by supporting productive team interactions, pressing for justification and sense-making, and guiding student presentations without turning CL into content delivery.

Spring Quarter Focus. Building on Winter's work on cognitive demand and equitable facilitation, Spring training turns toward instructional design and the learning sciences: how to construct tasks with clear goals and aligned assessment (Backward Design), how to support students working on quantitative word problems, and what cognitive science tells us about how learning actually happens.

Learning Goals for the Spring Quarter

By the end of the Spring quarter, participants will be able to:

- **Apply Backward Design** to evaluate and articulate the learning goals, acceptable evidence, and learning activities for CL tutorial tasks, and identify misalignments between these three stages.

- **Facilitate quantitative word problems** by identifying linguistic and conceptual barriers, helping students extract mathematical structure, and asking questions that keep interpretation work with the students rather than the facilitator.
- **Engage multiple learning modalities** by recognizing how students with different learning styles approach mathematical tasks, and using facilitation moves that support visual, verbal, and kinesthetic engagement with course material.
- **Support concept map construction** as a tool for students to organize mathematical knowledge, identify connections between ideas, and surface gaps in understanding that can guide facilitation in real time.
- **Apply principles from the cognitive science of learning** (retrieval practice, spacing, interleaving, worked examples) to understand why certain CL structures are effective and to make more informed facilitation choices.
- **Diagnose and respond to student thinking** by identifying common patterns of mathematical error and confusion, interpreting what student responses reveal about understanding, and selecting follow-up questions that address the underlying reasoning rather than the surface mistake.
- Use reflective journaling and peer observation to track their own growth as facilitators, identify recurring patterns in their practice, and set concrete goals for continued improvement.

Components of the Program

Weekly Training Meetings

Pedagogy Training

Each week, we will debrief tutorial challenges/successes and develop facilitation skills that strengthen student-to-student collaboration and conceptual learning. To prepare for the weekly pedagogical training session, the Lead Junior Tutors will need to:

- Submit a reflective journal entry after their CL tutorials.
- Submit any assigned observation artifact for the week.
- Update student attendance/participation records in Canvas.
- Complete any assigned reading and a brief reflection.

During the pedagogy meeting, participants should actively engage in discussions by sharing ideas and listening to others. The notes and slides from the meetings will be posted on Canvas within a day.

Content Analysis Training

During content analysis, participants will examine the upcoming week's tutorial problem set from students' perspectives and prepare to facilitate it effectively. Each week we will:

- Identify the learning goals for the problems and classify them into appropriate levels of the Cognitive Demand Framework with proper justification.
- Identify prerequisite knowledge and write diagnostic probing questions.
- Anticipate misconceptions/sticking points and draft leading questions that preserve cognitive demand (avoid converting tasks into procedures).
- Plan for presentations and whole-class synthesis using a shared routine (anticipate-monitor-select-sequence-connect), as needed.
- Design at least two short metacognitive "takeaway" questions, including one that slows down superficial speed.

Onboarding Requirement for LJTs New to the Program

Any LJT employed during the Spring quarter who did not complete the Autumn or Winter quarter training and/or the Orientation Week training is required to complete the following additional onboarding steps:

1. Complete a minimum of six hours of self-paced onboarding in Canvas (recorded training videos and assigned readings). This onboarding is self-assessed; LJTs are expected to engage actively and come prepared to discuss the content.
2. Meet with the tutorial coordinator during Week 1 to discuss the onboarding content and complete any required follow-up tasks.
3. Observe one tutorial led by an experienced LJT (assigned by the coordinator) continuing from the previous quarter and submit a peer observation report by the end of Week 2.

Feedback/Assessment

- The Lead Junior Tutors will be observed by the GTAs or the instructor. You will be scored based on a rubric and provided with written feedback about your performance. The rubric will be available on Canvas.
- You will receive feedback from your peers, who will submit observation reports towards the end of the quarter. You will not be assessed based on their feedback; rather, the goal is to improve your ability to provide objective feedback.
- After the end of the quarter, you will receive feedback from the students through a survey.

Attendance/Credit

This training carries no academic credit or grade. It is a required component of the Lead Junior Tutor appointment, and participants are expected to attend all scheduled training meetings and complete the associated weekly reflections and submissions.

If you anticipate missing a session, notify me as soon as possible (ideally at least a week before the meeting). If you are ill, please prioritize your health and avoid attending in person. Communicate promptly so we can arrange a makeup plan.

Make-up work (required for any absence):
To make up a missed training session, you must complete:

1. The assigned reading/viewing and a short written reflection, and
2. A brief check-in with me (online or over email) before your next tutorial, and
3. Any missed weekly administrative items within the week.

Repeated missed trainings (or failure to complete make-up requirements) will be documented and reported to the co-directors of Undergraduate Studies in the Math department and may affect continued appointment or reappointment decisions (e.g., probation or non-renewal).

Planned Content for the Spring Quarter

Week 1 – Backward Design

We will introduce the Backward Design framework (Wiggins & McTighe) as a lens for evaluating tutorial tasks. LJTs will practice identifying desired results, acceptable evidence, and learning activities for CL problems, and diagnose common misalignments between these three stages.

Week 2 – Quantitative Word Problems

We will examine word problems as a distinctive facilitation challenge: students must extract mathematical structure from context, manage linguistic barriers, and resist premature algebraic translation. LJTs will develop questioning strategies that keep interpretation work with students rather than moving it to the facilitator.

Week 3 – Journal Reflection

This week is dedicated to structured reflection. LJTs will bring their reflective journals and examine patterns in their facilitation practice over the first two weeks. We will use guided prompts to connect observations from tutorials to the frameworks introduced in Weeks 1 and 2, and set concrete goals for the remainder of the quarter.

Week 4 – Integrating Styles and Modes of Learning

We will discuss Chapter 22 (Integrating Styles and Modes of Learning) of "Teaching at Its Best," 5th ed., by Zakrajsek & Nilson (2023). We will explore different learning style myths and various modes of learning. In part I, we will focus on the Reading, Listening, Speaking, Experiential, and Writing modes.

Week 5 – Concept Map and the Visual Modality

In part II, we will focus on the Visual mode. LJTs will learn how to utilize visual aids for learning, such as concept maps, Venn diagrams, or infographics. We will also discuss how to combine the modes.

Week 6 – Cognitive Science of Learning

We will draw on cognitive science research to understand why certain instructional structures work. Topics include retrieval practice, spacing and interleaving, worked examples versus problem solving, and the conditions under which productive struggle leads to durable learning. LJTs will connect these principles to specific design features of CL tutorials.

Week 7 – What Could They Possibly Be Thinking?!

LJTs will prepare by reviewing Chapter 4 (Sequences and Series) from "What Could They Possibly Be Thinking" by Kung & Speer (2020). Afterward, we will engage in an in-class discussion that focuses on gaining a deeper understanding of student thinking through their mistakes.

Week 8 – Debrief of LJT Handbook

Week 9 – Catch-up/Conclusion/Party Time!