

Collaborative Learning Pedagogy and Content Analysis Training

20XX – 20YY SYLLABUS

Key Information

- **Instructor:** Subhadip Chowdhury (he/him), subhadip@uchicago.edu
- **Graduate TA:** XXX YYYY (XX/XX), XX@uchicago.edu

Pedagogy Training	Friday	1:30pm-2:20pm	TBA
		2:30pm-3:20pm	TBA
Content Analysis Training	Monday	1:30pm-3:20pm	TBA
		3:30pm-5:20pm	TBA

Training Program Description and Learning Goals

The training program is designed to support the undergraduate Lead Junior Tutors and the graduate Teaching Assistants in the Collaborative Learning Tutorial program, which supplements the Elementary Function and Calculus (Math 131-132-133) sequence in the Mathematics Department. **Collaborative Learning** is a highly structured form of group work based on the POGIL (Process Oriented Guided Inquiry Learning) model. During the Orientation Week meetings, we will describe its key features and how it differs from “traditional” group work.

Our goal is to use collaborative practices to deepen students’ conceptual understanding of the course material, enhancing their performance in homework, exams, and problem-solving in general. As a Lead Junior Tutor, you will facilitate the process by leading small teams of students as they analyze supplemental problem sets written by the Instructional Faculty, designed explicitly for enhanced team interaction.

The training program aims to provide a formal education in evidence-based collaborative learning pedagogies through supportive supervision and to discuss their practical implementation in the context of the Math 130s sequence. Participants will also review the weekly problem set and discuss it through the pedagogical lens of a collaborative learning facilitator.

Learning Goals for the First Quarter

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

- Apply a Purpose-Process-Product method to address classroom challenges effectively.
- Identify the behaviors and attitudes necessary for promoting a safe learning environment and successful academic teamwork.
- Implement multiple roles that are instrumental for productive small-group learning interactions.
- Refine observation skills to recognize student behaviors as evidence of learning.
- Facilitate small group activities and engaging presentations that enhance student learning.
- Design appropriate leading and follow-up questions that promote conceptual understanding and improve metacognition.

Learning Goals for the Second Quarter

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

- Select and create appropriate mathematical tasks based on a cognitive demand framework.
- Design S.M.A.R.T. Goals to improve their instructional and leadership strategies and keep track of their progress.
- Improve their management (planning, organizing, directing, coordinating) skills for more effective collaboration during the tutorials.
- Understand how to guide students to an awareness of higher-level thinking based on their current level of intellectual development.
- Refine their observation skills via peer visits and feedback.

Learning Goals for the Third Quarter

By the end of the third quarter, participants will:

- Reflect on their experience and collaboratively draft, review, and organize a handbook that synthesizes best practices for leading a tutorial.
- Learn to modify tutorial content and plan their tutorial interactions using the principles of Backward Design.
- Gain proficiency in combining multiple modes of learning to avoid meshing, specifically incorporating visual modes such as concept maps.
- Develop strategies to understand and address student misconceptions productively.

Components of the Program

Orientation Week Boot Camp

Collaborative Learning Orientation Boot Camp	Saturday, Week 0	1-4:30 pm
	Sunday, Week 0	1-4 pm

Before the weekly training begins, LJTs will attend a two-day Collaborative Learning Orientation Boot Camp on Saturday and Sunday prior to the start of the Autumn Quarter. This orientation will introduce the underlying theoretical foundation of collaborative learning, including constructivist learning theory, Bloom's taxonomy, and cognitive load theory. Furthermore, the orientation will cover the specifics of the Math department tutorial program and the roles of a Graduate Teaching Assistant or Lead Junior Tutor within this framework, ensuring participants are well-prepared and confident in their responsibilities.

The sessions will be recorded, and the slides will be available for new LJTs joining in future quarters.

Weekly Training Meetings

Pedagogy Training

Each week, we will meet to discuss the challenges and successes of the Collaborative Learning tutorial sessions. We will also discuss the pedagogical philosophy that motivates collaborative learning and hone the skills necessary to successfully facilitate CL tutorials.

In preparation for the pedagogical training session each week, the Lead Junior Tutors will need to:

- Submit a reflective journal entry after their Collaborative Learning tutorials.
- Submit any assigned observation report (e.g., peer feedback, time management sheet, strategy analyst notes, etc.) for the week.
- Update student attendance/participation records in CANVAS.
- Read and reflect upon any assigned reading that provides the foundation for the week's pedagogical topic.

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

Content Analysis Training

During the problem set analysis training, participants will examine the weekly tutorial problem set in the upcoming week from their students' perspectives. We will

- Identify the learning goals for the problems and classify them into appropriate levels of Bloom's taxonomy or the Cognitive demand framework with proper justification.

- Identify the background content a student needs to start working on the problems, and design some probing questions you can ask to verify whether a student has the prior knowledge (beyond just asking whether or not they have covered it in class).
- Identify possible misconceptions or sticking points a student might have while working through the problems. and design some leading questions you can ask to help them with it.
- Design at least two questions that you can ask to ensure a student has fully understood the main learning goals of the problems.
 - These should be short and metacognitive questions that can be used to highlight the main takeaway.
 - One of the questions should be something that can be used to slow down students who are going too fast with a superficial understanding and ensure they spend time fully exploring an idea.

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 written feedback about your performance. The rubric is 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

There is no credit or grades associated with the training. Since this is an integral part of the job duties of a Lead Junior Tutor, participants are expected to attend all weekly training workshops and complete their weekly journal reflections.

If you believe you will be absent from an upcoming training session, please inform me as soon as possible. To make up for the absence, you will be required to complete some additional reading or journaling and have a check-in meeting with me before your next tutorial.

Failure to attend or satisfactorily make up the absence for multiple training workshops per quarter will result in reports to the co-directors of Undergraduate Studies in the Math department and may affect salary and rehiring decisions.

Planned Content for the First Quarter

Orientation Week - Active Practice & The First Tutorial

During the second day of the orientation week boot camp, LJTs will practice facilitating segments of the first Collaborative Learning tutorial. LJTs will learn to

- establish their authority in the classroom, convey tutorial expectations and policies,
- motivate students to engage in this non-traditional classroom format, and
- institute standard classroom procedures. These include assigning small groups and roles within the groups, facilitating discussions without providing answers, and guiding group presentations.

Week 1

No Pedagogy training on Monday. Week 1 Content Analysis training will be on Friday.

Week 2 - 3P Framework & The Manager role

In their first training session, LJTs will reflect on the challenges and successes reported in their written reflections from the first week's tutorial. Through guided mentorship, participants will learn to apply the 3P method (Purpose, Process, Product) to address classroom challenges effectively. The two most common challenges identified in the reflections will be selected, and LJTs will create a 3P solution to implement during their next training workshop. Typically, the most common challenge is the lack of equitable student-to-student collaboration among team members, so this session will focus on defining and identifying how the Manager role can be utilized to foster a more balanced and productive group dynamic.

Week 3 - Supporting Claims with Student Behaviors as Evidence

This week, LJTs will refine their ability to observe and document student behavior as evidence of learning. The session will begin with some sample case studies, where participants will practice identifying key behaviors that indicate student understanding. Through a Think-Pair-Share activity, LJTs will compare observations with peers to better distinguish evidence from analysis. Next, LJTs will review their reflections, focusing on how well specific, observable behaviors were cited. Finally, participants will sign up for peer observations (to be completed by week 7), where they will complete forms focused on documenting evidence and analysis, thereby enhancing their ability to gather valuable insights for improving tutorial effectiveness.

Week 4 – Handling Disruptive Student Behavior & Introduction to the Strategy Analyst Role

Using observations from the journal reflections, we will attempt to identify the general patterns of disruptive student behavior and brainstorm solutions to address such issues. Next, Lead Junior Tutors will divide into groups and discuss the purpose of the Strategy Analyst role and the type of content that should go into a strategy analyst sheet. They will be asked to emulate the role during the Content Analysis session and work with students to complete some sample Strategy Analyst sheets.

Week 5 – Metacognition and Strategy Analysis Debrief

We will start by discussing what makes a good minute paper question and how refining it can help gather actionable feedback. Then, they will review the strategy analysis sheet submitted last week and discuss how to facilitate the creation of Strategy Analyst sheets that would be useful for student metacognition. As a task to be completed before the next training session, they will be asked to document how they engage with the audience during presentations.

Week 6 – Effective Presentations & The Spokesperson Role

During this training workshop, Lead Junior Tutors will brainstorm and identify behavioral evidence of engaging presentations that enhance student learning. The session will focus on specific actions that can be used by Lead Junior Tutors to facilitate more engaging and effective presentations that focus on presenting general, transferable problem-solving strategies rather than specific solution steps. Participants will create a 3P plan for enhancing the presentation portion of the tutorials.

Week 7 – Operant Conditioning

We will review the challenges and successes reported in the weekly reflections. LJTs will be introduced to classical conditioning and the four quadrants of operant conditioning, which provides a framework for reinforcing and increasing the incidence of desired student behaviors, and for decreasing the incidence of undesired behaviors. LJTs will then analyze a variety of classroom scenarios and possible instructor responses. They will identify which quadrant of operant conditioning is being employed to achieve classroom learning goals and the impact that these responses have on affective student attitudes. LJTs will be asked to report in their reflection about a situation in their classroom.

Week 8 - Facilitating Discussion by Asking Effective Questions

Lead Junior Tutors will discuss how to design effective questions that facilitate meaningful discussion. We will discuss how to anticipate possible student responses, how to handle incorrect

student responses, strategies to use when students do not respond, and strategies to respond to unanticipated student questions. Finally, we will discuss the purpose and usefulness of Wait Time to enhance classroom interactions.

Week 9 - Learning from Observing Each Other

We will discuss end-of-quarter planning and administrative details, including attendance records and soliciting student evaluations/feedback. Lead Junior Tutors will assess what they learned about their own leadership strategies from their peer observation and reflect on the quarter, identifying key areas of improvement that need to be addressed next quarter.

Planned Content for the Second Quarter

Week 1 – A Framework for Selecting Appropriate Mathematical Tasks

Week 2 – S.M.A.R.T. Goals

Week 3

No Pedagogy training (MLK day)

Week 4 - Time Management & Pacing Strategies

Week 5 – Authority in the Classroom

Week 6 – Applying Perry’s Scheme to Support Metacognition

Week 7 – Equitable Turn-Taking

Week 8 – Process Skills

Week 9 – Learning from Feedback

Planned Content for the Third Quarter

Week 1 – Logistics and Content Analysis for Week 1

LJTs will analyze the tutorial problems for week 1 Tuesday and Thursday.

Week 2 – Creating a Handbook for LJTs

We will debrief the student feedback from the last two quarters, and based on this LJTs will discuss the essential components and structure for a future LJT handbook. They will be assigned to create the content for individual chapters over the quarter in a common google doc.

Week 3 - Backward Design

We will discuss Chapter 1 (Backward Design) of “Understanding by Design” by Wiggins & McTighe (2005). LJTs will learn the three-stage process of Backward Design and develop the tutorial content for an upcoming week using this process.

Week 4 – 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 5 – Integrating Styles and Modes of Learning Part I

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 6 – Integrating Styles and Modes of Learning Part II

In part II, we will focus on the Visual mode. LJT's 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 7 – DBER Paper

The LJT's will read and reflect on a Math DBER or SoTL paper relevant to Collaborative Learning.

Week 8 – Debrief of LJT Handbook

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