

# Groupwork Pedagogy for Addressing Classroom Social Inequalities

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eCOTS 2020



# How Smart Are You?

- What criteria would you use to rank yourself compared to all other participants in this session?
- Spend 30 seconds thinking about this
- Use the Google Doc (link in Zoom Chat session) to share some of your criteria in **Question 1**

# How Smart Are You?



- What **criteria** did you use to determine if you are smart?
  - Type and Length of Education, Degree
  - Research output
  - Speed of problem solving
  - Coding prowess
  - Gender
  - Race/ethnicity
  - Reading ability
  - Age
  - Social Class
  - ...
- These are **status characteristics**
- If status is not managed, you will have **unequal participation**

# Why did this become important to us?

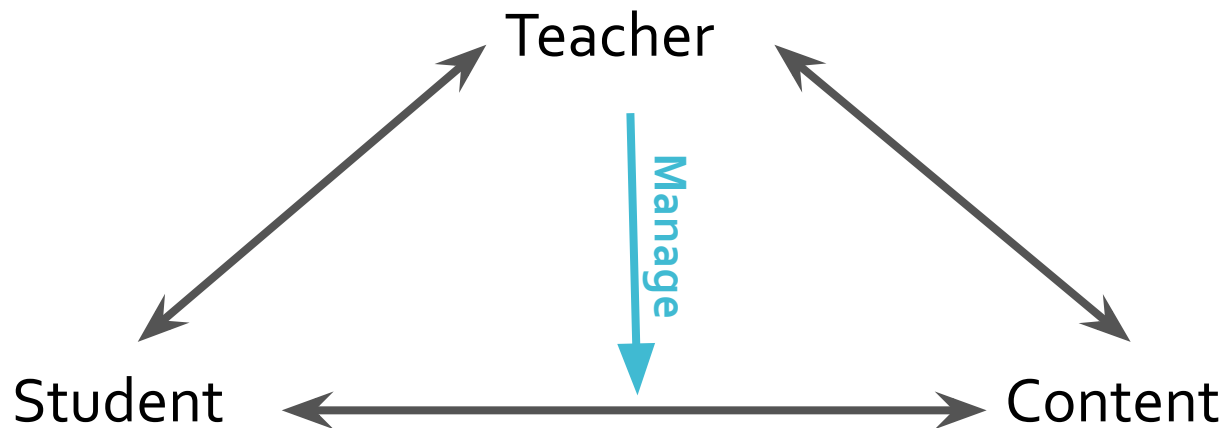
- In Fall 2018, the entire California State University system moved away from mathematics remediation
- CSUMB chose a **co-mingled corequisite model**
  - **Corequisites** are support courses taken alongside a college-level course
  - **Co-mingling**: mixing college-ready and underprepared students in the same Intro Stat class. Underprepared students enroll in separate corequisite course
- We realized we must address status across all of our statistics courses



# Complex Instruction

Which pedagogy?

**Our goal was to provide:**  
**Instructors** with the tools to develop each student's sense of belonging  
**and**  
**Students** with tools to be successful learners.



Complex Instruction

# What is Complex Instruction?

Complex Instruction is a combination of pedagogical strategies used to create a **classroom 'social system'** that directly attends to problems of **social inequality**, which **undermine academic access and achievement** if left unexamined\*

- Widely developed in secondary mathematics
- Disrupt typical hierarchies of **who is "smart"** and **who is "not"**\*\*

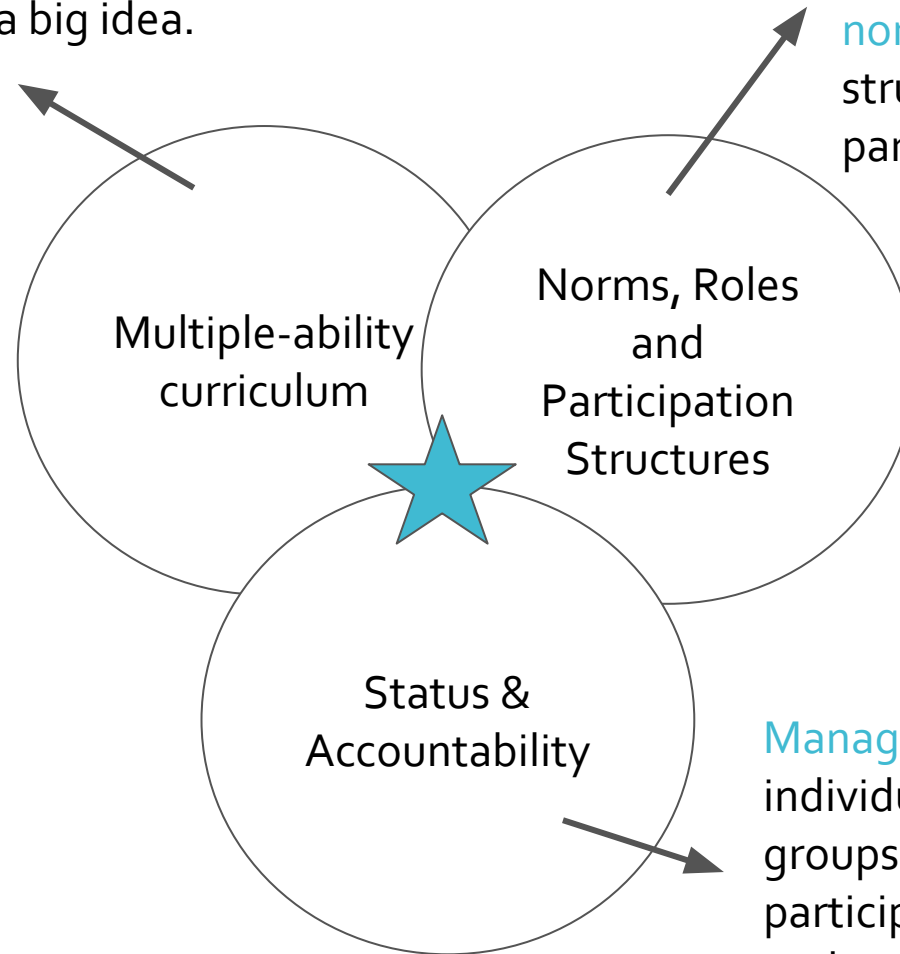
\*Source: Lisa Jilk, 2009

\*\*Sapon-Shevin, 2004

# Complex Instruction

Provide curricular activities that are **open-ended**, rich in **multiple abilities**, and **support learning** important math concepts and skills central to a big idea.

Develop **autonomy** of and interdependence of **small groups** through the use of **norms, roles** and other structures of participation



**Manage status** and hold individuals and small groups **accountable** for participation and understanding.



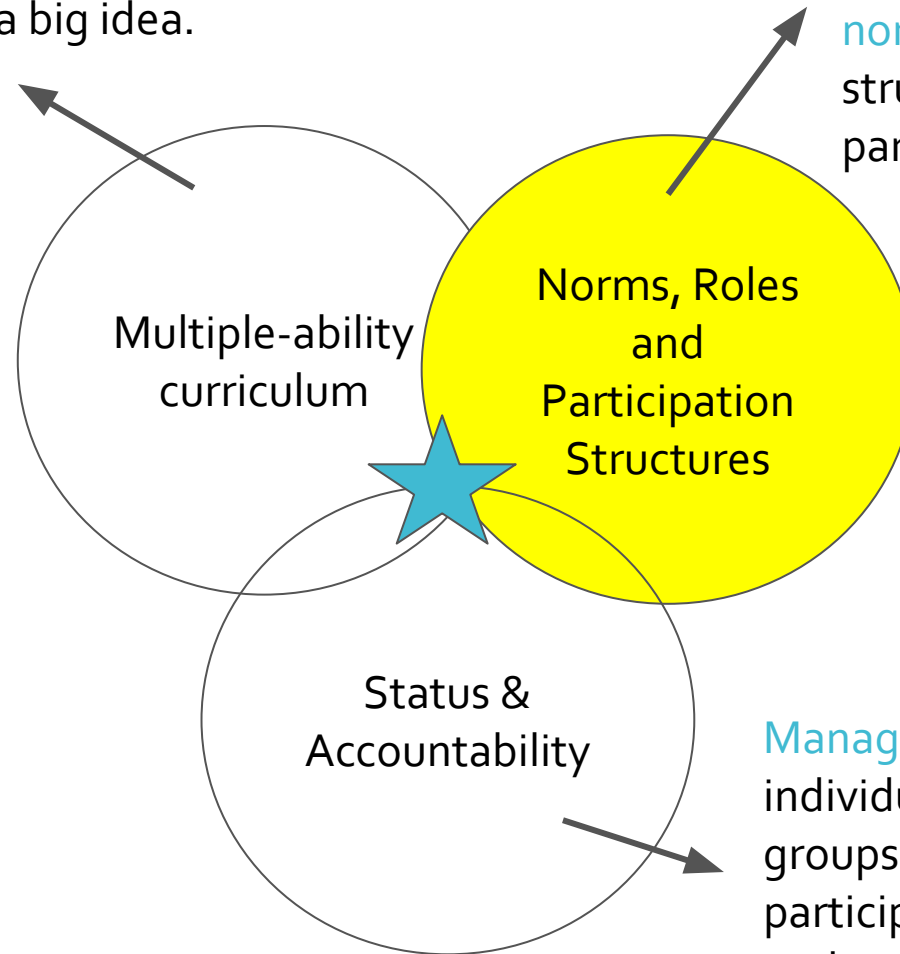
How do students currently engage in groupwork in your intro stat courses?

- Please answer **Question 2** in the Google Doc

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# Norms

## How we learn together

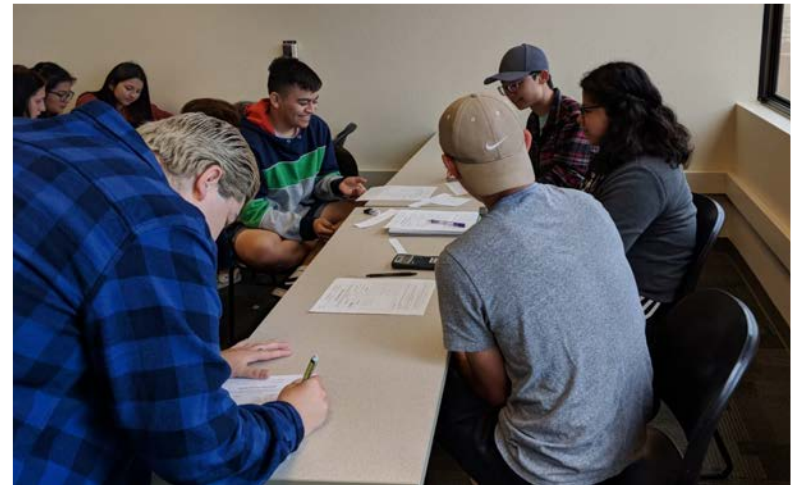
- No one is done until everyone is done.
- You have the right to ask anyone in your group for help
- You have the duty to assist anyone in your group who asks for help
- Helping peers means explaining thinking, not giving answers or doing work for others
- Provide justification when you make a statement
- Only ask the instructor when it's a *team question*
- Think and work together. Don't divide up the work.
- Work within your group - no crosstalk with other groups.
- **No one is as smart as all of us together!**

# Participation Structures

and

Roles

- Instructor randomly assigns groups of 3-4 students
  - Re-randomize groups about every three weeks
  - **Why randomize?** Each student is equally capable!
- Each group member has a randomly-assigned **role**
  - **Facilitator** – keep the team working
  - **Resource Manager** – managing questions
  - **Recorder/Reporter** – everyone ready to present
  - **Team Captain** – encourage participation
- Roles relate to **how** work should be done



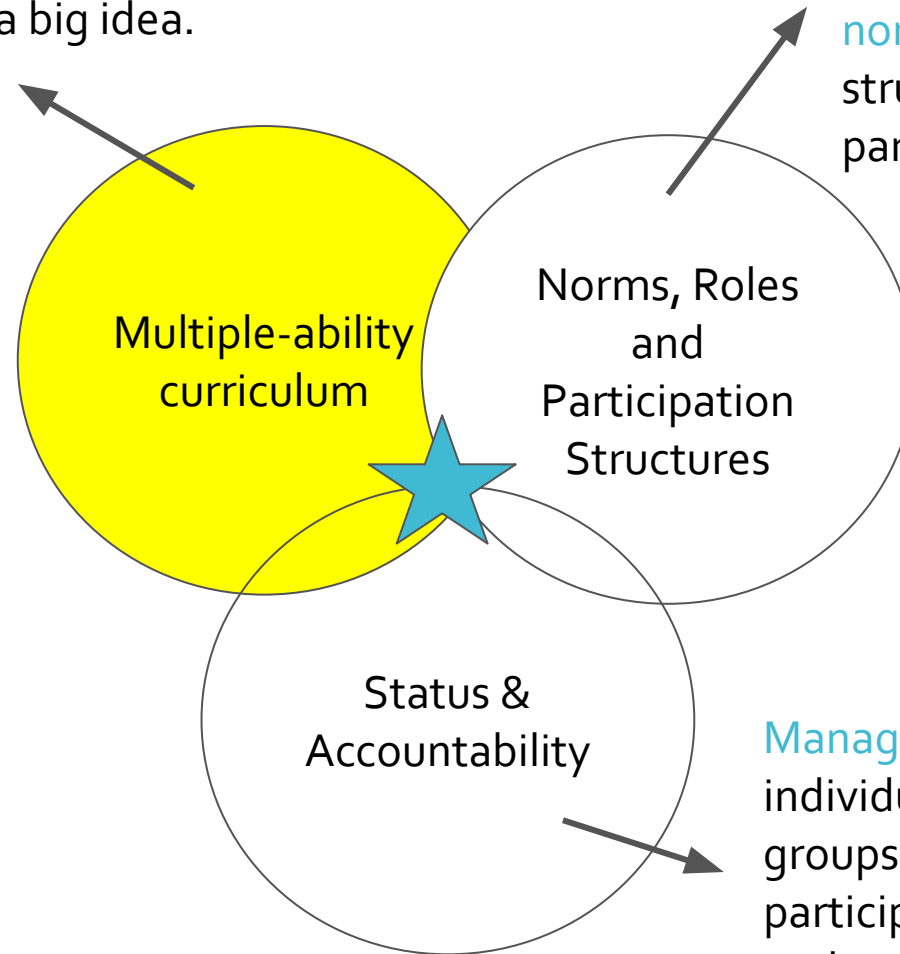
How does preparation/  
background  
knowledge  
vary from  
student to  
student in  
your intro stat  
classroom?

- Please answer **Question 3** in the Google Doc

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# Multiple-Ability Curriculum

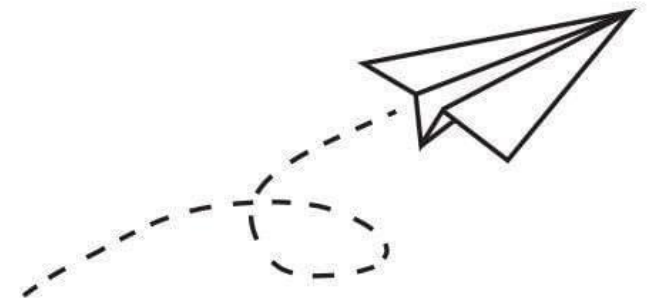
## What inspires groups to rely on each other and utilize their roles?

- **Groupworthy Tasks!**

- Open-ended, uncertain tasks
- Multiple entry points; tasks requires multiple abilities to complete
- Intellectually important content

- **Example:** Groups must follow an experimental protocol to compare paper airplane flights with and without a paperclip. They collect data, enter into the computer, and analyze.

- Attention to detail
- Airplane construction
- Measurement
- Data entry and organization
- Spreadsheet knowledge
- Utilizing statistical software
- Time management



What  
challenges do  
you encounter  
when  
implementing  
groupwork?

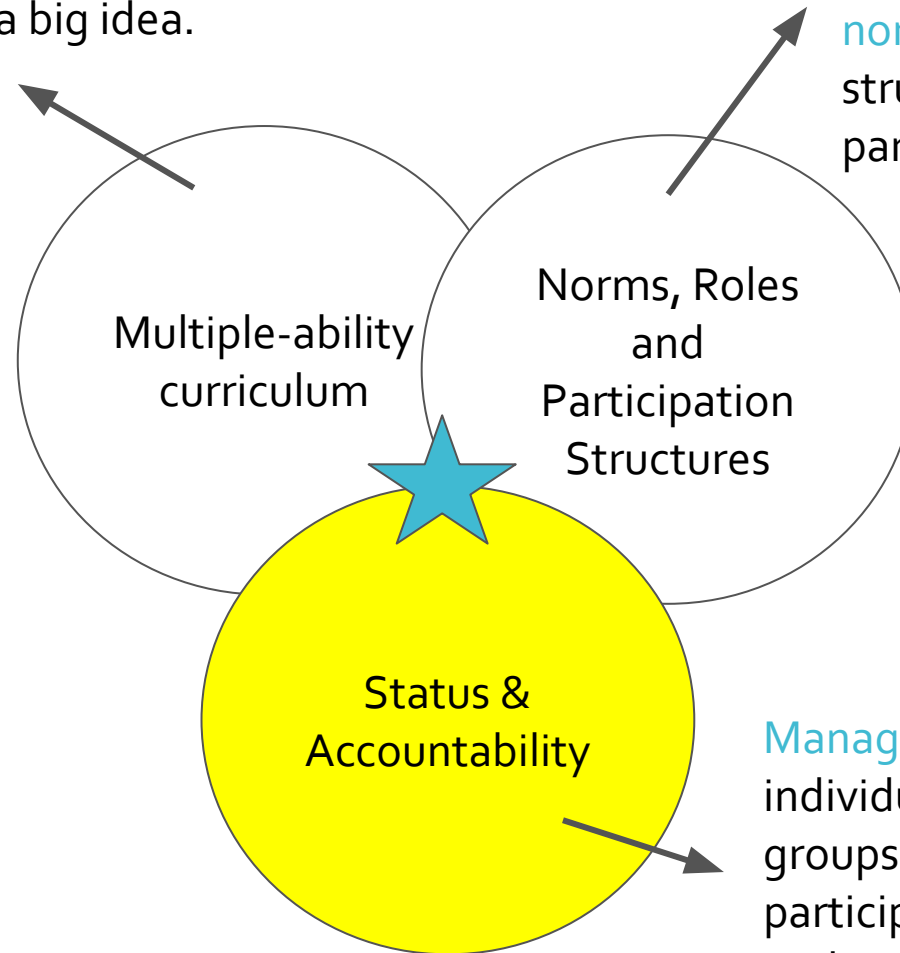
- Please answer **Question 4** in the Google Doc



# Complex Instruction

Provide curricular activities that are **open-ended**, rich in **multiple abilities**, and **support learning** important math concepts and skills central to a big idea.

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# Status and Accountability



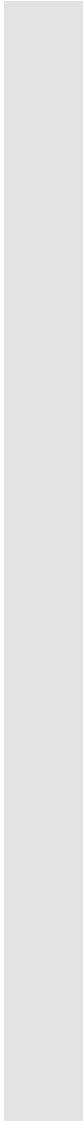

## How Smart Are You?

- **Status characteristics** are how students rank themselves in the classroom.
- If status is not managed, you will have **unequal participation**

# Status and Accountability

## How do we manage status?

- **Randomize groups:** all students equally capable
- **Norms** help insure no one is excluded
- **Roles** manage assumptions of competence
  - Not just *"you will be good at the coding"*
- **Multiple abilities** needed to solve a problem
  - Not just *"how fast can you calculate that"*
- **Assigning Competence:** figure out **how** your students are smart and tell them **out loud!**



How did the students  
respond?

# Student Pushback

- Students often complained that they were expected to teach themselves
  - Students wanted their professors to “lecture more”
- Students get frustrated having to ask a question to their group first before going to the instructor
- Students feel that the roles are juvenile

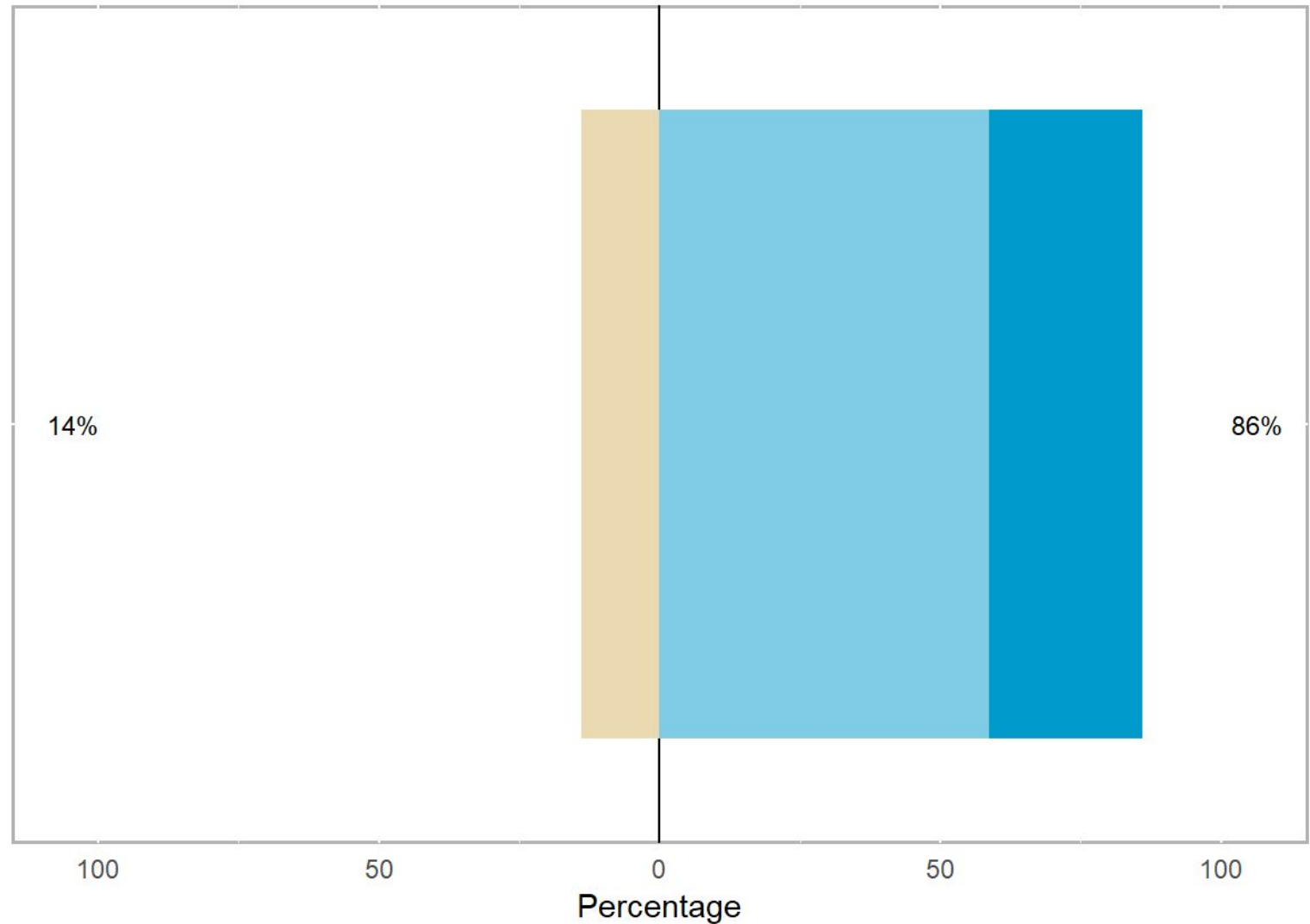
# What do Students Think of Complex Instruction?

- **We switch it up and I kind of like that** .... It doesn't feel like they're strangers. Every group that we've been with, we all have each other's contact information and ... **we don't feel embarrassed asking questions.** This is even from the beginning.
- ...So it's definitely **given me a sense of belonging** where I have the numbers I can contact half the people in the class
- I can turn to ask a question to my group member and then four weeks from now when they're no longer my group member they'll still be able to help me with a question... **I can go to anyone** and if they're struggling we will struggle together and **we'll figure it out.**



# What do Students Think of Complex Instruction?

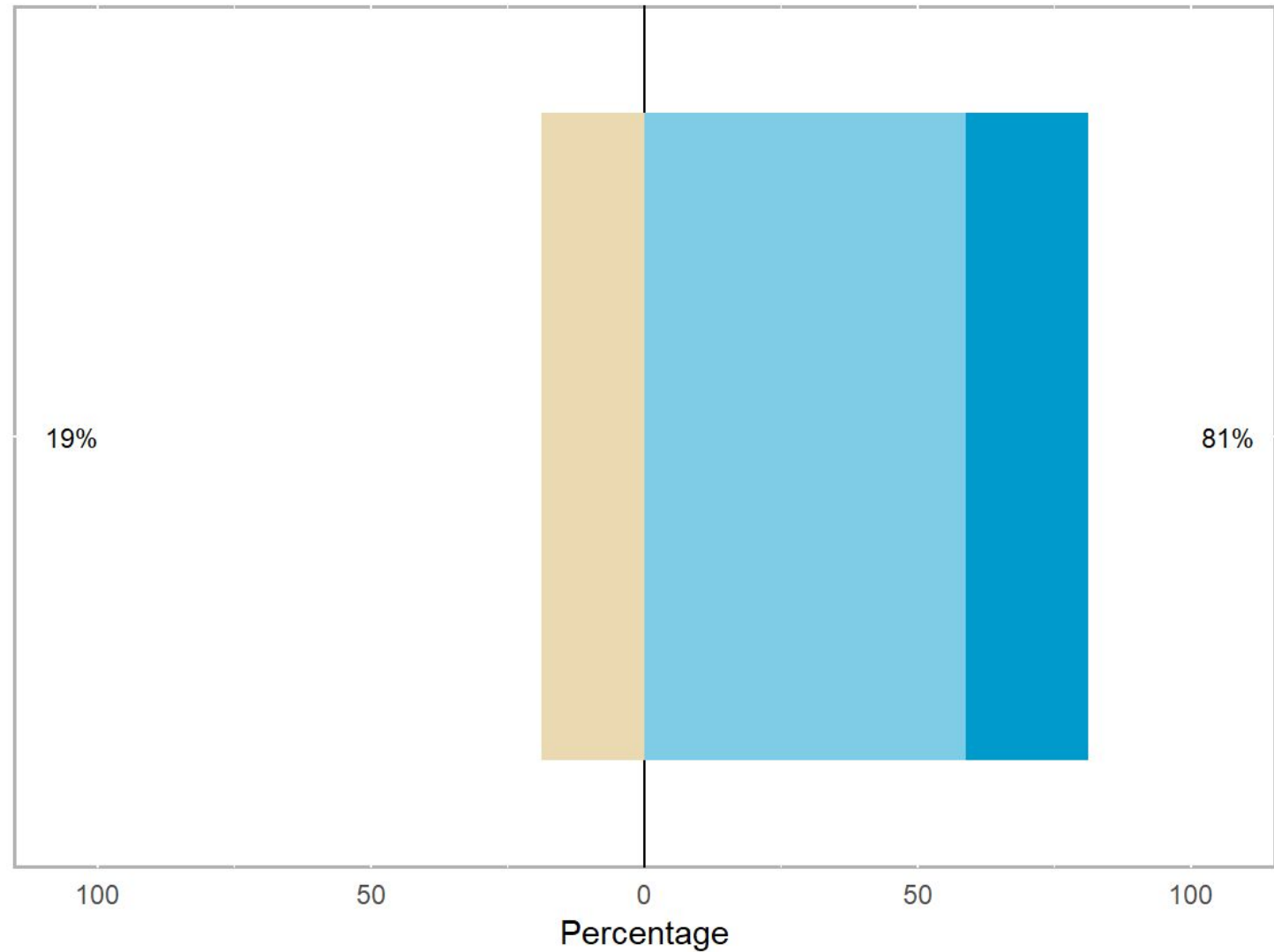
I benefited from working with my peers during class activities:



Response Strongly Disagree Disagree Agree Strongly Agree

# What do Students Think of Complex Instruction?

I was able to contribute to group discussions in class:

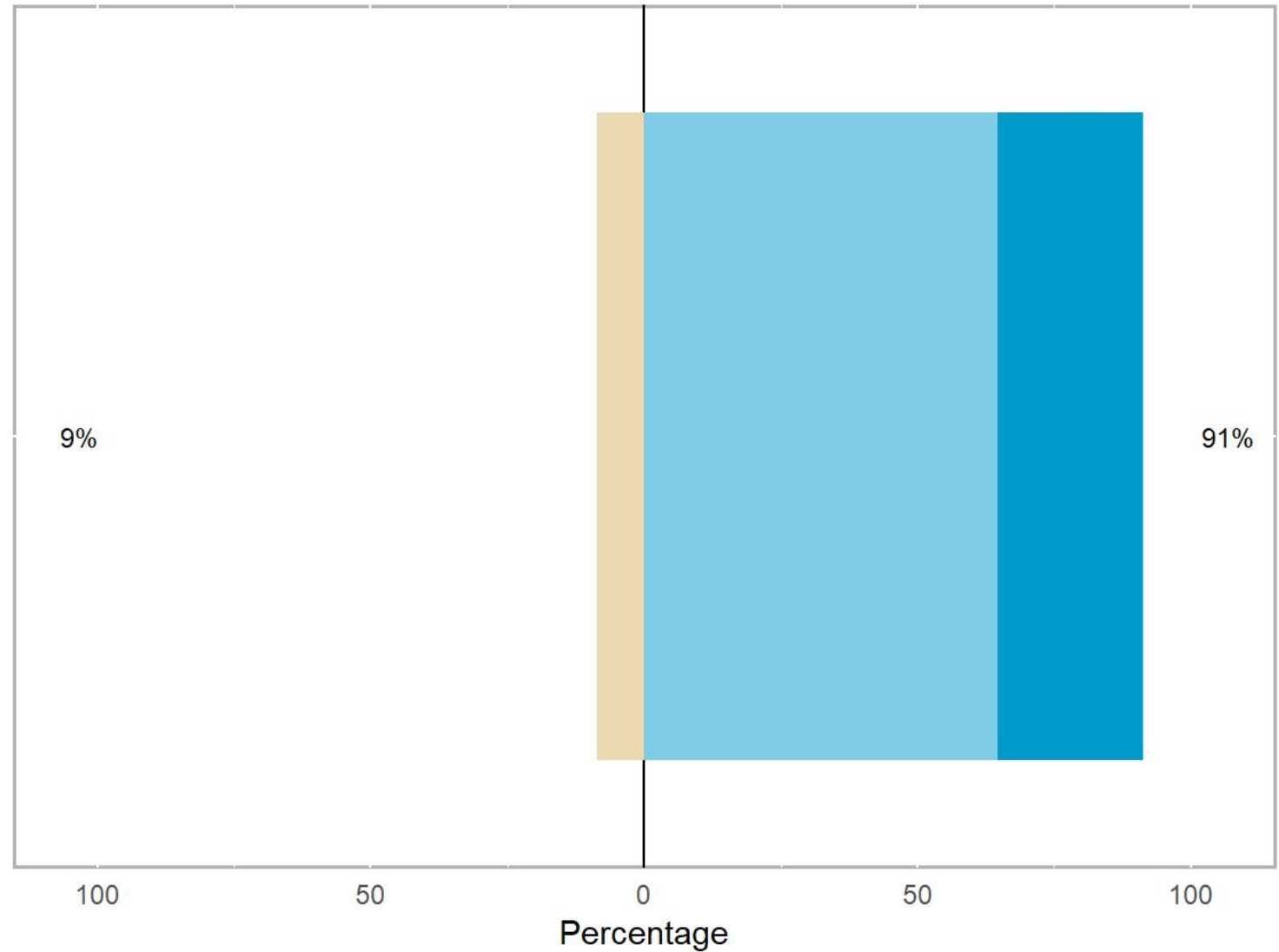


Response Strongly Disagree Disagree Agree Strongly Agree



# What do Students Think of Complex Instruction?

The class environment created by my professor was supportive:



Response Strongly Disagree Disagree Agree Strongly Agree

Are underprepared students successful in Intro Stat?

- In 2016 school year:

**77%**



Equity Gap!

**57%**

Percent of students who passed Intro Stat and did not require math remediation (n=315)

Percent of students who passed Intro Stat after successfully completing math remediation (n=269)

- 
- In Spring 2019:

**80.5%**

Percent of students who passed Intro Stat without taking the corequisite (n=215)

**87.1%**

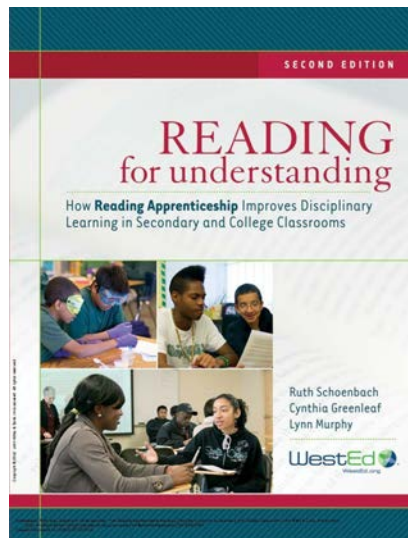
Percent of students who took the corequisite course and passed Intro Stat (n=62)

# Transition to Remote Teaching

- **Asynchronous:** mini video-lectures for each class period
- **Synchronous:** activity time after watching video-lectures
- Use **randomized Zoom breakout rooms** for groupwork
  - Students used Google docs to write group answers
  - Students can “call” the instructor to join their breakout room for questions
- **Challenges:**
  - Managing status. More check-ins required outside of class.
  - Group roles and staying in groups for more than 1 day
  - Holding students accountable to participating in breakout rooms

# Practical Tips

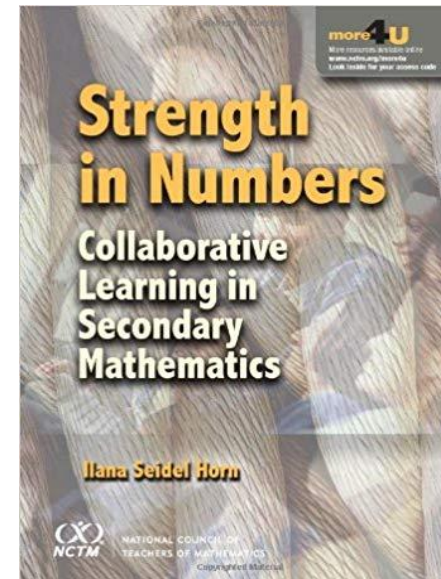
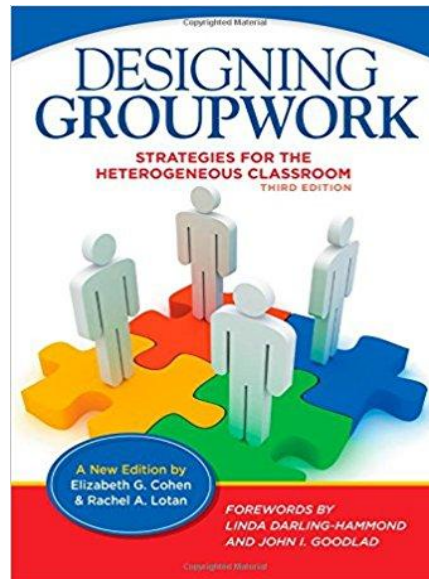
- Full buy-in to **complex instruction** is a lot of work and time
  - Need for professional development for all instructors to go all-in
- **Implementing roles can be challenging.** Utilize them when the task is complex enough.
- Group work takes a lot of time. We save time by implementing **Reading Apprenticeship**.
  - Daily reading assignments in preparation for next class
  - Reading Logs



Concept	My Understanding before the reading	New ideas/examples from the reading (include page or example #)	What I think these ideas and examples mean	Remaining Questions, New Insights, Strategies you used
Confidence intervals	Having understood somewhat correctly.	(p. 102) Plausible range of values for the population parameter; you need this in addition to applying a point estimate of a parameter	That we need to find not only an estimate but a good range of numbers for population parameters	Why is the plausible range different from a point estimate?
Constructing a 95% confidence interval	It captures the value we're after 	(p. 103) point estimate $\pm 1.96SE$ Standard Errors ex. $0.20 \pm 1.96 \times 0.078$ $\rightarrow (0.047, 0.353)$ means % in context of problem	I think it asks to get point estimate that's given as 20% in problem. input the SE that's given in the word problem	Where does the 1.96 come from?
Changing the confidence level	It asks to find a different point of value	(p. 106) Changing 95% to 99% it would become point estimate $\pm 2.58 SE$ 95% estimate $2.58 \times SE$ NOTE (106) $95\% - 1.96$ to $1.96$ 	It means you need to increase standard deviation	How does it become 2.58?

# Next Steps for YOU

- Check your equity gaps for Intro Stat (and for pre-calculus, calculus, etc...)
- Try **managing status** now!
- Try **randomizing** and rotating groups regularly
- Develop 1 or 2 truly **groupworthy** tasks
- Experiment with different **roles** and **participation structures**
- Read the books on **Complex instruction!**



Thank You!

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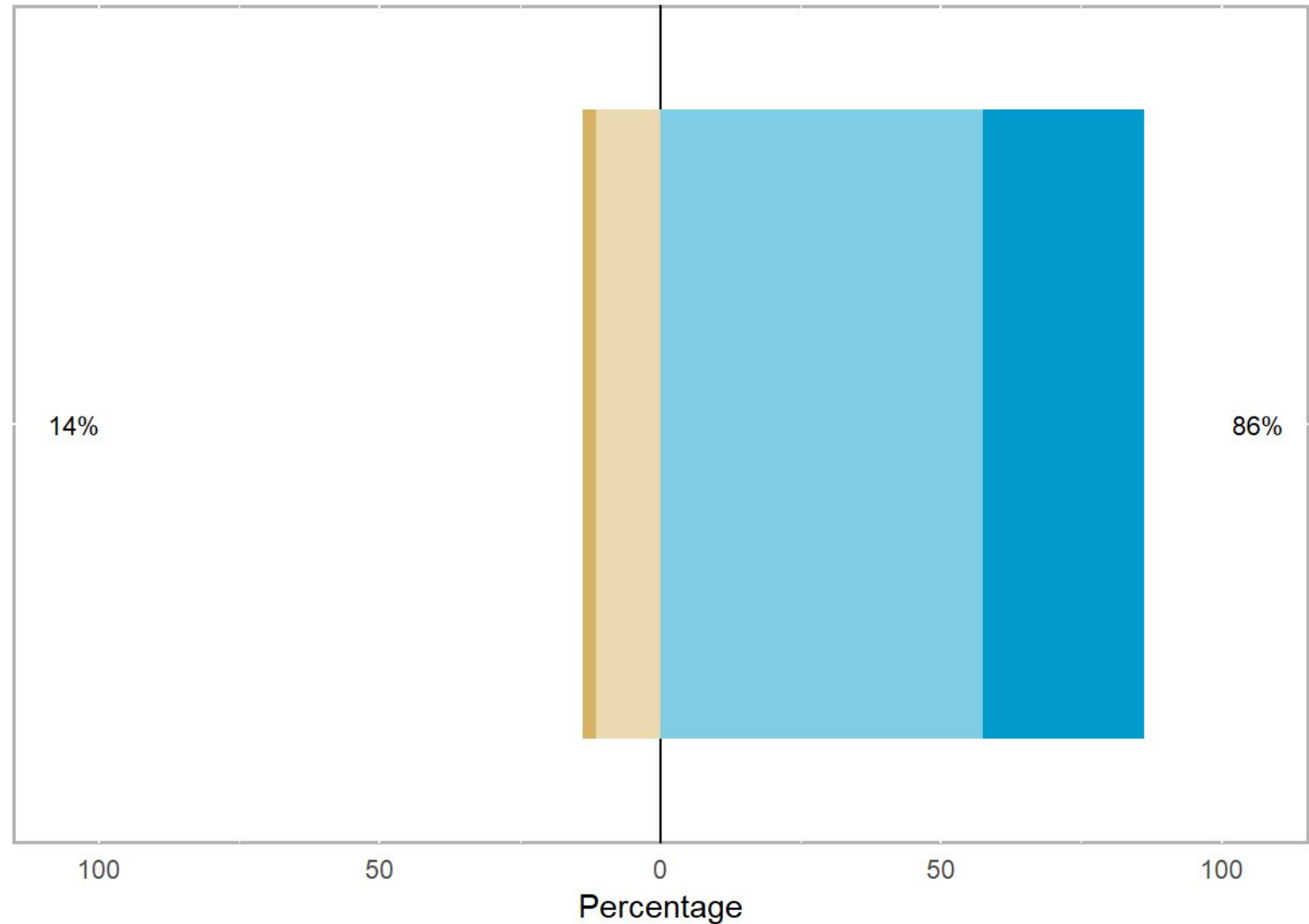
Special thanks also to Lisa Jilk for introducing our department to Complex Instruction!



Is the course  
still “rigorous”  
enough?

(Student  
Opinion)

How challenging did you find the course material?



Response ■ Very easy ■ Somewhat easy ■ Somewhat challenging ■ Very challenging