



# Diversifying discussions: How do we facilitate talking about biology in our classrooms?

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## Background

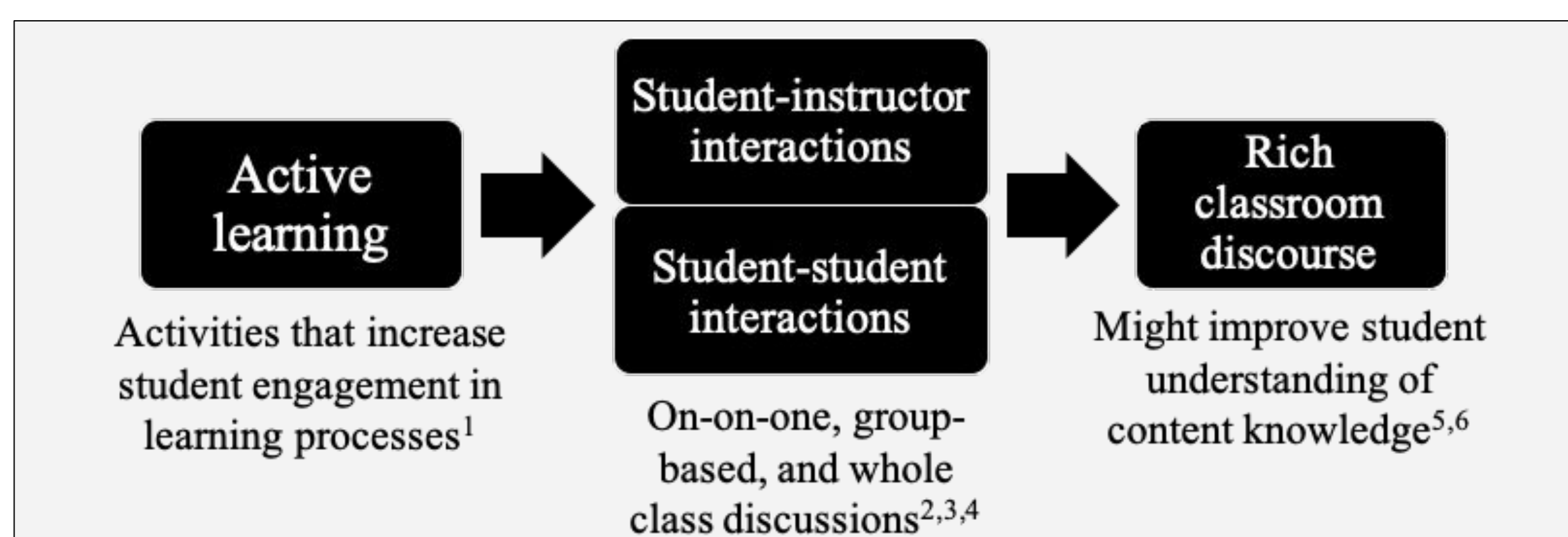


Figure 1: Student and instructor interactions promote rich classroom discourse.

- Most classroom observation protocols, like Classroom Observation Protocol for Undergraduate STEM (COPUS), measure classroom behaviors<sup>7</sup>
- Teacher Discourse Moves (TDMs): Specific classroom conversational strategies used by instructor to foster development of ideas

### Study Goal

Develop and validate a new instrument, Classroom Discourse Observation Protocol (CDOP), that reliability quantify TDMs from observational data in college biology classrooms.

## Developing TDM Codes

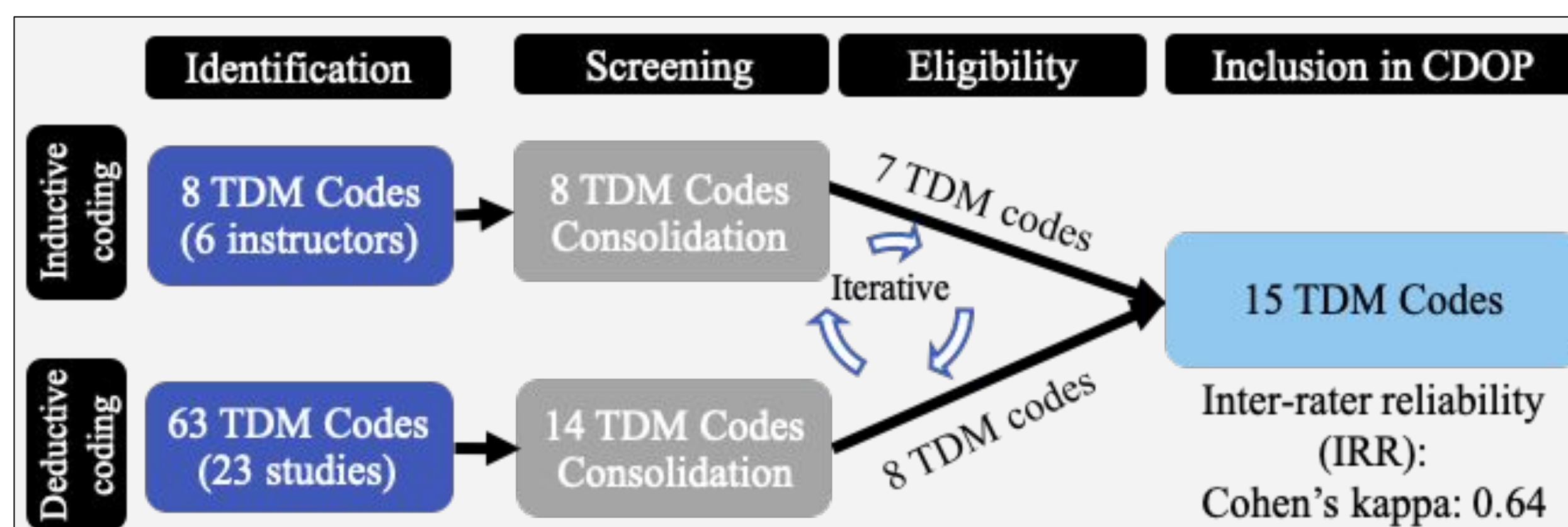


Figure 2: TDM codes generated from inductive and deductive coding methods.

## Coding Matrix

Instructor A: Mostly teacher-centered TDMs																	
Time (min)	1. Teacher-centered					2. Student-centered										3. Other	
	Share	Real W	Eval	Link	Frest	Gener	Check	Clari	Conn	Cntex	Repre	Const	Reqst	Expl	Chall	Other	NCD
0-2	1		1			1											
2-4							1										
4-6	1																
6-8	1																
8-10	1		1			1											

Instructor B: Mostly student-centered TDMs																	
Time (min)	1. Teacher-centered					2. Student-centered										3. Other	
	Share	Real W	Eval	Link	Frest	Gener	Check	Clari	Conn	Cntex	Repre	Const	Reqst	Expl	Chall	Other	NCD
0-2							1				1				1		
2-4							1	1					1				
4-6	1		1				1	1						1			
6-8	1		1				1	1									
8-10	1						1	1					1				

## Coding Scheme

Teacher-centered: Instructor is talking about content	
Codes	Code Description
Evaluating	Instructor repeats, accepts or rejects student's response, or responds that they don't know the answer to a student's question.
Forecasting	Instructor associates current topics to future topic.
Linking	Instructor associates past topic to current topic.
Real-Worlding	Instructor relates ideas to conventional knowledge, broader perspective, or personal experiences.
Sharing	Instructor shares information, answers student question, or provides instructions for finding the solution.
Student-centered: Instructor asks students to talk about content	
Codes	Code Description
Generative	Instructor asks student to recall facts, and basic concepts, or related information.
Checking-in	Instructor asks student if they have a question or need clarification.
Clarifying	Instructor asks student to elaborate on condensed, cryptic, or inexplicit statement.
Connecting	Instructor asks student to associate past topic to current topic.
Contextualizing	Instructor asks students to connect ideas to conventional knowledge, broader perspective, and their personal experiences.
Representing	Instructor asks student to create a visual or mathematical representation of content.
Constructing	Instructor asks students to build knowledge by interpreting and/or making judgments based on evidence, data, and/or model.
Requesting	Instructor asks student to justify or explain their reasoning.
Explaining	Instructor asks student to explain reasoning to other students.
challenging	Instructor asks student to evaluate another student's idea.
Other	
Codes	Code Description
No Content Discourse	Instructor is not talking or asking students to talk about content.
Other	TDM not described by these codes.

## Inter-Rater Reliability

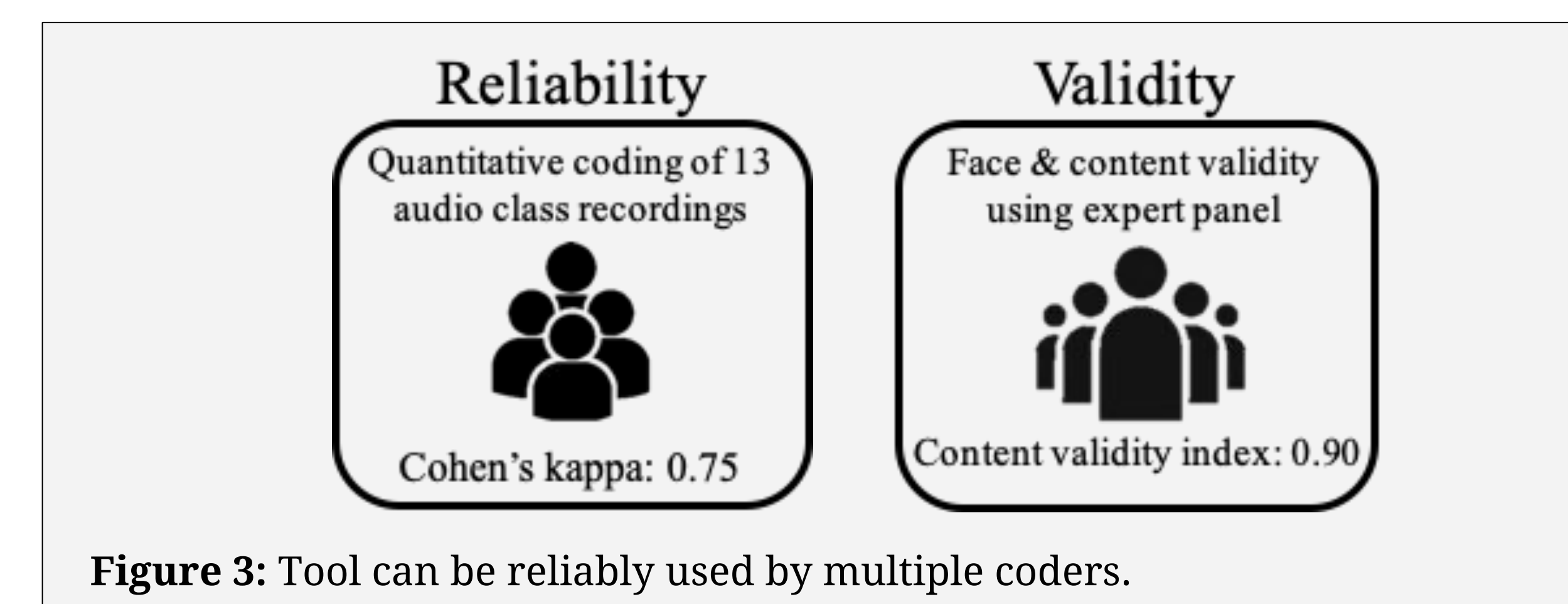


Figure 3: Tool can be reliably used by multiple coders.

## Instructor Profiles

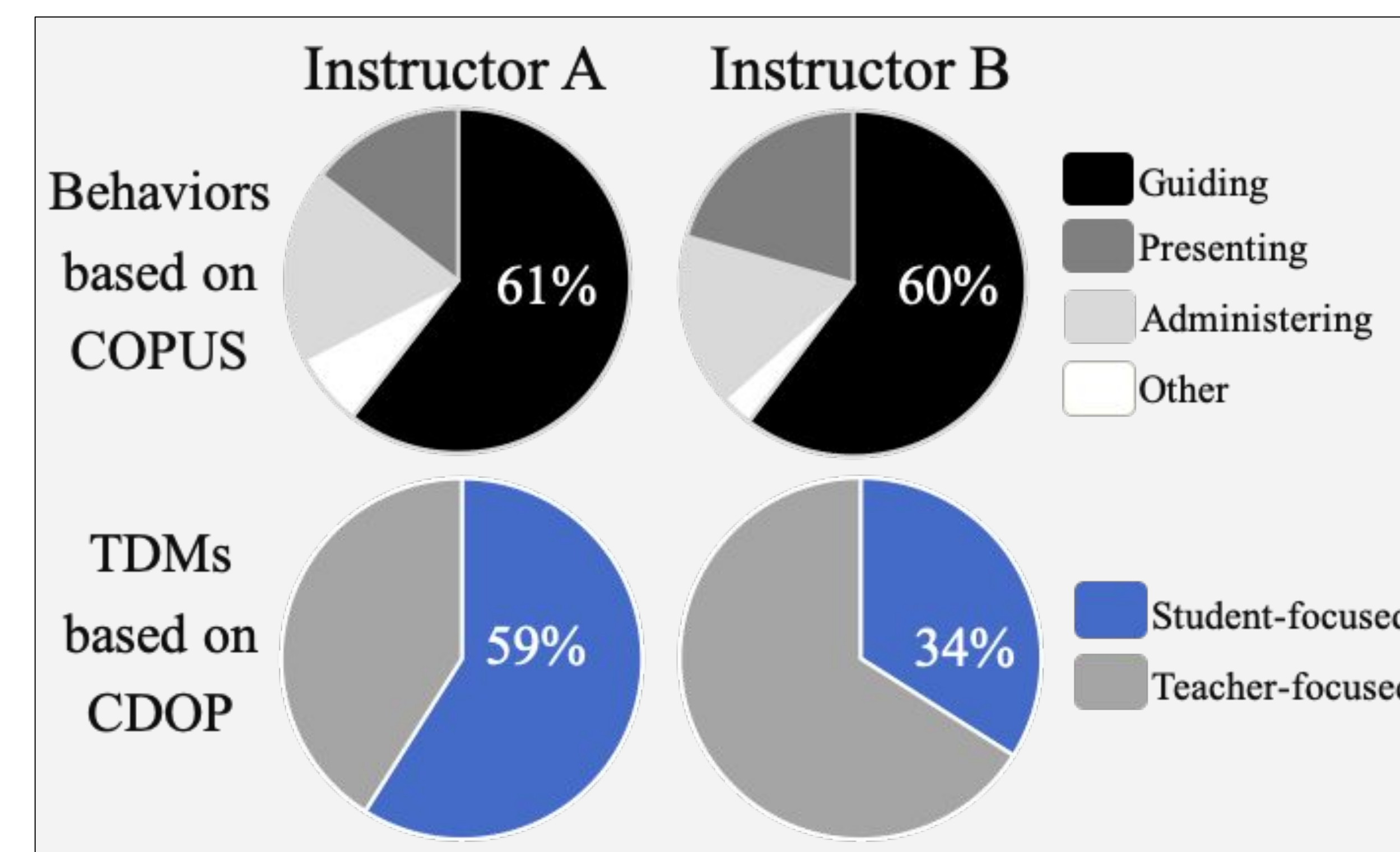


Figure 3: Comparison of results given using both COPUS and CDOP, illustrating that CDOP can distinguish differences in TDMs even in equivalently highly engaged classrooms.

## Conclusions

- Extant classroom observation protocols measure behaviors, not TDMs in college biology classrooms.
- A new instrument, CDOP, that reliably quantifies TDMs from observational data was developed and validated.
- CDOP detects differences amongst instructors using similar active learning strategies.

### Future Directions

- Is there a differential impact of various TDMs on student learning gains?
- How applicable is CDOP across other STEM disciplines (chemistry, mathematics, physics, etc.)?

## References

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