

Supplemental Material

CBE—Life Sciences Education

Zagallo *et al.*

Figure S1. Full code list and descriptions with **bolded codes used for cluster analysis. Codes in bold font indicate the final 19 codes used in cluster analysis.**

Category	Code	Description– When instructor expresses ...	
Knowledge of Students	cares about students’ thinking	<ul style="list-style-type: none"> care about how students connect ideas/concepts interest for how students arrive at right or wrong answers 	
	students need incentive/accountability to work	<ul style="list-style-type: none"> that students need motivation to do work a value for putting accountability on students for promoting their learning 	
	understands students’ backgrounds and frustrations	<ul style="list-style-type: none"> understanding for where their students are coming from ability to place themselves in their students’ shoes 	
	understands students’ struggles	<ul style="list-style-type: none"> knowledge about students’ cognition, including areas where students typically struggle knowledge of students’ productive and/or unproductive tendencies/study habits 	
	cares about providing feedback to students	<ul style="list-style-type: none"> students need feedback to learn and grow 	
	apply tasks to real life	<ul style="list-style-type: none"> students learn better with real-life examples or connections 	
	percieved student barrier/deficit	<ul style="list-style-type: none"> something their student(s) do that they feels is a barrier they must overcome in their teaching 	
	expressed frustrations about students or jaded feeling on the students	<ul style="list-style-type: none"> feeling tired of the things they percieve as constant issues their students have or do in class frustrations with students something was the students' responsibility to do, not the instructor's no shared responsiibility and blames the student that students need to start pulling their own weight expectation that students do their own learning and can self-assess what to study and do 	
	Teaching Values	values that students can synthesize info delivered	<ul style="list-style-type: none"> a value for having students be able to synthesize information
		values peer interactions	<ul style="list-style-type: none"> a value that students learn and make sense of things using their classmates
values provoking misconception for students’ sake		<ul style="list-style-type: none"> a value for eliciting or bringing up known misconceptions in class as teaching moments for the students 	
values students using scientific practices		<ul style="list-style-type: none"> a value that students can do disciplinary practices such as modeling, data interpretation, experimental design, etc. 	
values clear communication of expectations and goals to students		<ul style="list-style-type: none"> a value for clear communication so students know instructors’ expectations and learning objectives 	
values engagement or keeping their interest	<ul style="list-style-type: none"> it is important to them to see the student engagement, or that students’ interests are hooked to promote learning 		
uses humor to motivate/engage	<ul style="list-style-type: none"> they use humor or own enthusiasm to keep students interested/engaged 		

Approaches to Innovations	values students problem solving and application	<ul style="list-style-type: none"> • a value that students learn to problem solve or apply knowledge/skills to other tasks
	values connecting with students and their development	<ul style="list-style-type: none"> • a value to understand and connect to their students' lives with the intention to help or promote their learning
	growth mindset	<ul style="list-style-type: none"> • an attitude that teaching is an improvement process that takes time
	too organized/structured: backwards design	<ul style="list-style-type: none"> • idea that backwards design is too much structure and view it as teaching to the test or bad for learning • idea that students need structure at the beginning of college but true learning does not need structure
	low comfort level of student-driven class	<ul style="list-style-type: none"> • discomfort of giving students more control over their learning for any number of reasons such as appearing as a non-expert on a subject topic that students bring up unsolicited
	values targeted instruction	<ul style="list-style-type: none"> • an appreciation for backward design, structure, plans, or aligned goals
	uses assessment to inform students	<ul style="list-style-type: none"> • assessment is not used to inform their teaching • a use of assessment as a means to notify students where they are at, provide feedback for students, promote student engagement, or any use that seems to be for the students' benefit
	uses assessment to inform teaching	<ul style="list-style-type: none"> • assessment is used to inform their teaching, their thinking about teaching, their knowledge about their students' thinking, and how well they communicated material
	likes or dislikes AACR because it targets known student struggles (misconceptions)	<ul style="list-style-type: none"> • liking AACR items because they target known student misconceptions, so instructors feels they gain knowledge about student thinking • disliking AACR items because they target known student misconceptions, so instructor feels they gain no new knowledge about student thinking
	wants own accountability	<ul style="list-style-type: none"> • wanting an evaluation of self in terms of doing a good job (affective) instead of informing teaching • they like having measures of evaluating their own teaching because it holds them accountable to do better
insightful comments about assessments and curriculum design/use	<ul style="list-style-type: none"> • expert-like knowledge about assessments that could only come from practice 	
maxed out their teaching or expertise teaching	<ul style="list-style-type: none"> • they cannot use innovative practices because they are not "experts" with it and are "experts" in their own teaching practice • a fear that they will not implement innovative practice correctly • feeling they already do all they can and adding another teaching strategy is useless 	
empty implementation of innovations	<ul style="list-style-type: none"> • using an innovation without a personal motivation or rationale 	
personal preference to teach active way or traditional way	<ul style="list-style-type: none"> • it is their personal preference to teach actively, for example they feel bored teaching in traditional lecture way • it is their personal preference to teach a traditional way and provide personal reasons for why 	

	trouble w/interpreting student thinking, making curricula to address	<ul style="list-style-type: none"> • trouble analyzing student work in efficient or useful ways • they don't know how to change their teaching or curricula to address any data on their teaching or known student misconceptions
	education research is complex and different than experimental research	<ul style="list-style-type: none"> • acknowledgement that education research is complex because it deals with humans and multiple, emergent systems • an understanding of the inherent limitations of education research
	education research is like experimental research	<ul style="list-style-type: none"> • awareness of a specific established education research finding • a view of education research as having the same "rules" as controlled lab experiments, and apply similar thinking and interpretations to it
	critique of AACR	<ul style="list-style-type: none"> • any critique (negative) of AACR, such as of questions, wording, analysis process, timing turnaround, etc.
Perceived Barriers	neutral knowledge of the educational context	<ul style="list-style-type: none"> • matter of fact knowledge about a local, cultural, or organizational factor beyond their control (higher education factors), for example online learning, the format of training, the format of teaching
	negative situational factors	<ul style="list-style-type: none"> • knowledge of educational context, but comes off as negative and inhibiting in their view
	positive situational factors	<ul style="list-style-type: none"> • knowledge of educational context, but comes off as positive and acting as affordances in their view
	personal history acts as barrier	<ul style="list-style-type: none"> • personal history as a student or in own research/domain acts as a barrier to their teaching
	personal history acts as asset	<ul style="list-style-type: none"> • personal history as a student or in own research/domain acts as an asset, not a barrier, to their teaching
Desired PD Outcomes	understands students' reactions to activities	<ul style="list-style-type: none"> • wanting a better understanding of students' reactions to known activities (do students like it, do students rebel, do students engage, etc.)
	sharing of own classroom research/empirical data	<ul style="list-style-type: none"> • they would like to share their own classroom research/data much like how researchers enjoy sharing their own lab's results/findings among colleagues
	wants a resource of fresh ideas to choose from and shared knowledge	<ul style="list-style-type: none"> • they would like ideas for how to teach a topic or skill or ideas for activities • wanting to share and learn from each others' experiential knowledge about students or how to teach certain topics
	wants help motivating and engaging students	<ul style="list-style-type: none"> • they need help specifically with getting more students engaged
	wants help adapting activities find cool to their class	<ul style="list-style-type: none"> • they would like not only a resource of ideas but how to adapt them to their class specifically as well
	wants a coordinated effort tackling misconceptions	<ul style="list-style-type: none"> • wanting ways to measure student progress through college for checking the status of student misconceptions after students leave their class • wanting communication among teaching colleagues for how to elicit and address student misconceptions across students' tenure in college

wants help coming to consensus about what to teach and to whom	<ul style="list-style-type: none">• wanting communication and a consensus among teaching colleagues in department for what to teach and who (which population of students) to target
wants/needs encouragement or asking for feedback to implement own ideas	<ul style="list-style-type: none">• ideas for activities or ways to adapt their classroom but still needs extra push of encouragement to enact on them because appears to be more of a confidence issue than a situational barrier issue
wants to learn more about misconceptions	<ul style="list-style-type: none">• they would like to learn more about misconceptions (usually wanting a list)
wants assessment ideas/items	<ul style="list-style-type: none">• they would like a source of assessment items and/or ideas for different ways to assess understanding of certain concepts/skills or for any other stated purpose
wants help giving feedback	<ul style="list-style-type: none">• they need help on how to provide feedback to students because they feel lost at what/how to do it to improve their learning

Figure S2. COPUS profiles for each participant across personas.

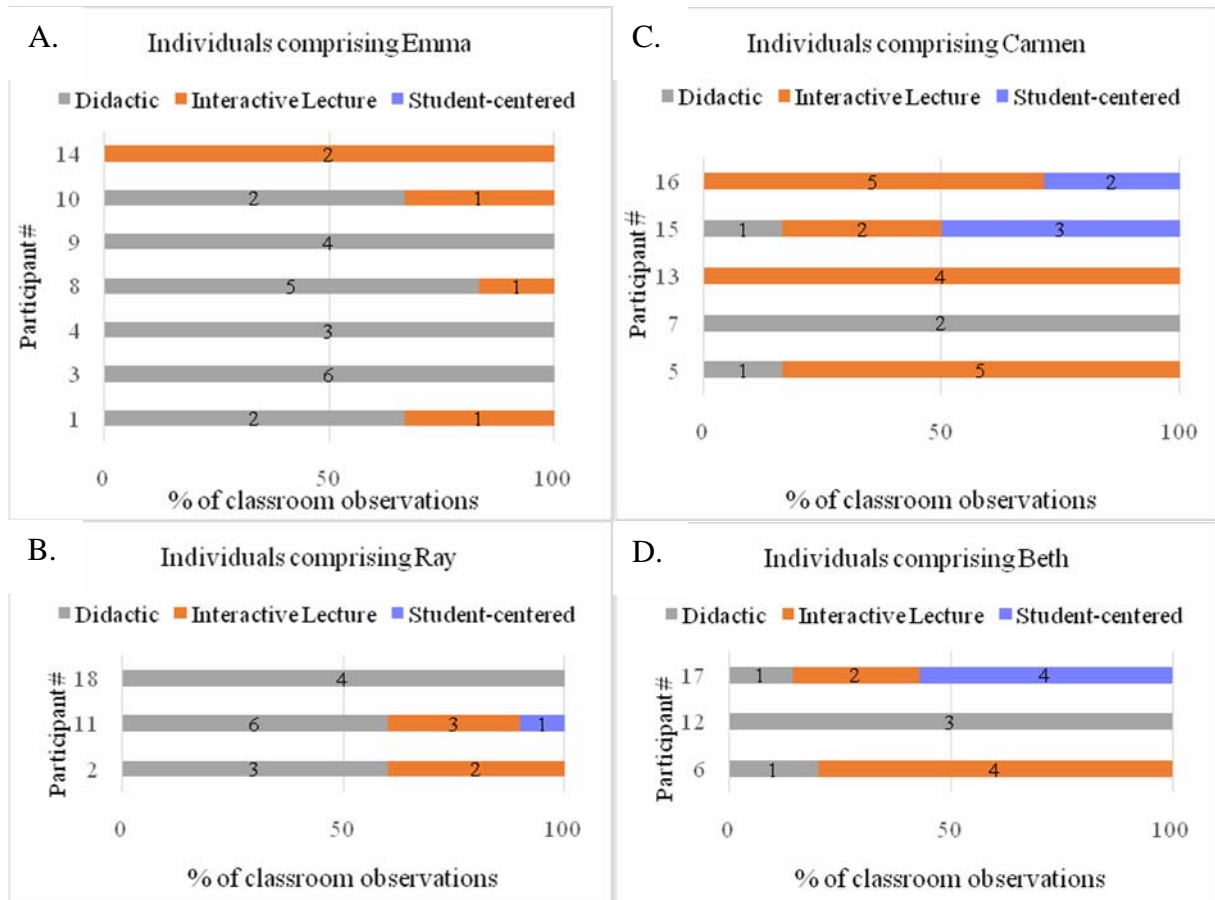


Figure S2. COPUS profiles for each participant generated using the COPUS analyzer (Staines et al., 2018). **A-D.** COPUS profiles for the participants comprising personas Emma, Ray, Carmen, and Beth, respectively. The numbers within the bars indicate the number of classroom observations corresponding to Didactic (gray), Interactive Lecture (orange), or Student-centered (purple) for each participant.

Figure S3. COPUS profile distribution across all classroom observations.

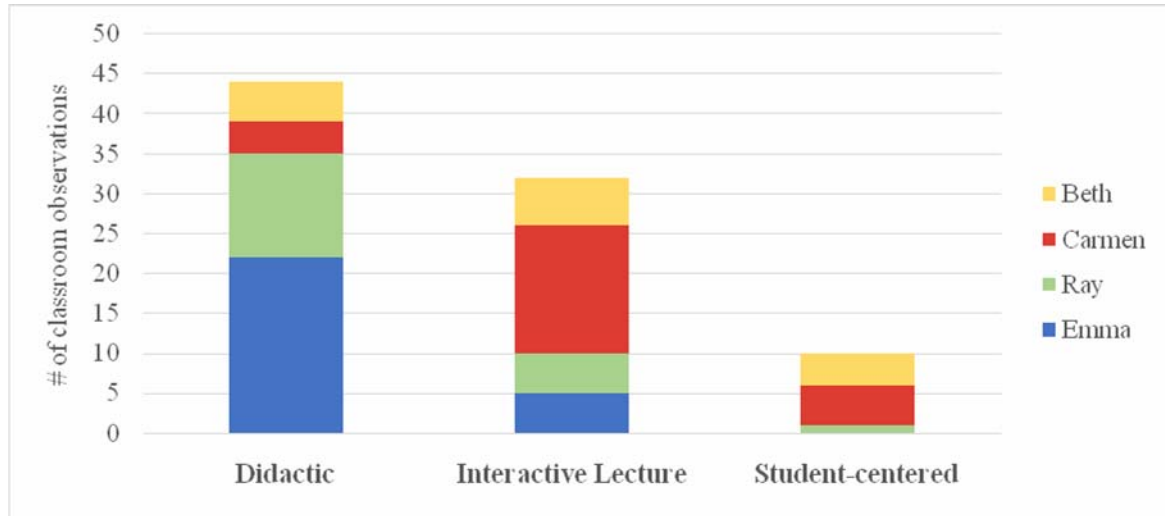


Figure S3. The distribution of COPUS profiles across personas. The COUS profiles were generated using the COPUS analyzer and its three COPUS cluster-caterogization: Didactic, Interactive Lecture or Student-centered (Staines et al., 2018). The persona Emma is shown in blue, Ray in green, Carmen in red, and Beth in yellow.