The Authoritative-to-Dialogic Spectrum of Facilitation Practices

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Abstract

One model characterizing instructor facilitation of student learning is the Formative Assessment Enactment Model (FAEM). The model describes instructors' facilitation practices as eliciting or advancing student thinking, guided by their purposes as well as by what they notice about and how they interpret student thinking. Eliciting and advancing moves can be enacted either in authoritative ways, driven by one perspective that has authority, or in dialogic ways, driven by multiple perspectives. While research suggests authoritativeness and dialogicity exist on a spectrum, there is no existing characterization of this spectrum that uses the theoretical underpinnings of these concepts, i.e., the perspectives centered. In the present study, we used the FAEM to characterize facilitation practices of 19 introductory science courses' learning assistants (LAs) during small group discussions, which revealed the existence of an authoritative-to-dialogic spectrum grounded in the perspectives centered. Here we report on this spectrum that reconsiders what perspectives can drive instructor enactment of facilitation other than the perspective of canonically correct science and the perspectives of the students involved in the discussion. This emerging characterization may be used by instructors to intentionally shift between authoritative and dialogic practices in their classrooms.

Problem. As education researchers continue to encourage equitable teaching approaches towards the universal goal of scientific literacy for all students, identifying facilitation practices that center student ideas, identities, and experiences has become increasingly important (Lederman et al., 2013; Patchen & Smithenry, 2013; Rosebery et al., 2016; van Es & Sherin, 2002). One such model that characterizes these practices is the Formative Assessment Enactment Model (FAEM) (Dini et al., 2020).

The FAEM describes instructors' facilitation practices as eliciting or advancing student thinking. Whether an instructor elicits or advances is guided by their noticing about students, their interpreting of student thinking, and their purposes developed in response to their observations (Fig. 1, Dini et al., 2020). Grounded in sociocultural theory, the FAEM is contingent upon the idea that understanding and learning result from dialogue with others as well as within one's mind (Bakhtin, 1934/2017; Voloshinov, 1929/1986; Vygotsky, 1934/1987; Wertsch, 1991/1993). More specifically, FAEM builds upon Mortimer and Scott's (2003) characterization of teacher-student discourse as allowing for a univocal perspective, i.e., authoritative, versus a multivocal perspective, i.e., dialogic. Whether instructors employ eliciting or advancing actions in authoritative or dialogic ways is guided by their purposes (Fig. 1).

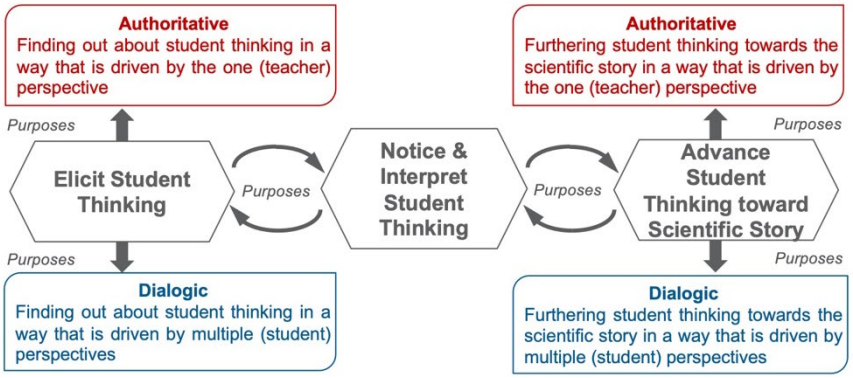

Fig. 1. The FAEM includes categories for teachers' actions (authoritative vs. dialogic; eliciting vs. advancing) while also recognizing and categorizing their observations (noticing and interpreting) and purposes when utilizing these actions (Dini et al., 2020).

The importance of dialogic discourse has been detailed by Freire (1968/2000), whose work suggests the power of dialogic actions to empower learners and combat oppressors. In science education, dialogic

discourse—particularly related to scientific inquiry—has been emphasized for its merits in developing scientific literacy (Lederman et al., 2013; Patchen & Smithenry, 2013). Thus, dialogic facilitation practices have the potential to provide equitable access to scientific literacy. The necessary tension between authoritative and dialogic discourse has been described by multiple researchers, specifically noting how both types of exchanges foster one another in an overall conversation (Lehesvuori et al., 2019; Scott et al., 2006). However, research shows that instructors more frequently employ authoritative facilitation strategies (Coffey et al., 2011; Russ et al., 2009), which are associated with limiting and even putting down student thinking (Chin, 2006). Teachers tend to use authoritative discourse when their goal is for students to appropriate canonical content. This purpose can be in tension with others that rely on students' perspectives gleaned from dialogic facilitation. It may therefore be useful to investigate the spectrum between authoritative and dialogic extremes that has been found in prior research (Lee & Kim, 2016; Van Booven, 2015). Some progress towards this end has been made; for instance, Van Booven (2015) has characterized a "'middle ground' between maximal authoritativeness and dialogicity," which they identify as separate from typical authoritative moves based on the "moderate cognitive, structural, and epistemological diversity" in student responses. However, researchers have yet to characterize this spectrum using the theoretical underpinnings of authoritativeness and dialogicity—in other words, using the perspective the instructor enacts. Thus, in the current study, we use theory and learning assistant (LA)-student interaction data to reconsider what perspectives can drive instructor enactment of facilitation other than the canonically correct scientific perspective and the perspective of the interacting students. In addition to bolstering theory around authoritative and dialogic discourse, this approach can also open new possibilities for instructors to navigate the tension between authoritativeness and dialogicity.

Design of the Study and Analysis. Data was collected over the span of two semesters from virtual, interactive, LA-supported Zoom lectures at two Northeastern US universities. Table 1 outlines characteristics of each university and the study contexts in which data was collected.

University	Type	Student body size	Racial/Ethnic Makeup	Classes observed
A	Public	Medium	Highly Diverse (<1% American Indian/Alaska Native, 14% Asian, 16% Black/African American, 18% Hispanic/Latino, 1% Cape Verdean, <1% Native Hawaiian/Pacific Islander, 3% Two or More Races, 33% White, 10% Non-Resident Alien, 5% Not Specified)	three introductory chemistry classes (number of students: n1 = 183, n2 = 97, n3 = 159; number of LAs: n1 = 4, n2 = 2, n3 = 1)
B	Private	Medium	Majority White (<1% American Indian/Alaska Native, 14% Asian, 4% Black or African American, 7% Hispanic, <1% Native Hawaiian or Pacific Islander, 53% White (non Hispanic), 5% Two or More Races, 11% Non-Resident Alien, 4% Race/Ethnicity Unknown)	one introductory chemistry class (number of students n4 = 141; number of LAs n4 = 5) four sections of introductory physics classes (number of students: n5 = 111, n6 = 72, n7 = 71, n8 = 128; number of LAs: n5 = 3, n6 = 1, n7 = 1, n8 = 2)

Table 1. Context of data collection

For each course, three lectures were recorded in their entirety, including breakout rooms with participating LAs and students. For each lecture, LAs had 1-4 breakout room recordings. Following each lecture, LAs were interviewed individually. During these interviews, clips from the LA's breakout room interactions were shown for stimulated recall and LAs were asked about what they noticed during their interactions, what their purposes were, and how they would describe their actions.

Synthesizing insights from the videos and transcripts of the LA-student interaction and the LA interview, we wrote a narrative that centered around LA actions and holistically described three constructs from the FAEM (LA's purposes, noticing, and interpreting) that guided their actions. Based on the FAEM, actions described in the narrative were coded as either authoritative or dialogic and either eliciting or advancing. This holistic narrative-based approach to coding, where one action often summarized multiple LA utterances in the LA-student interaction, allowed us to capture the context of the LAs' actions, in line with the sociocultural theory that guides FAEM itself (Bakhtin, 1934/2017; Moen, 2006; Vygotsky, 1934/1987). For intercoder reliability, the narrative writing and coding were first done by two researchers independently. Interactions were discussed weekly, and narratives and coding were revised based on our discussions.

During data analysis, patterns emerged around LA actions that we coded as authoritative due to their univocality and as dialogic due to their multivocality; in some cases, the LA took neither the perspective of canonically correct science often associated with authoritative actions nor the perspective of the students present in the discussion group often associated with dialogic actions. Through "thinking with theory," meaning that we used the underlying theoretical framework of FAEM, the data collected for this study, and our own experiences and plugged them into each other (Jackson & Mazzei, 2013), we developed two intermediary categories to encompass these actions, still recognizing the original definitions of authoritative/dialogic by Mortimer and Scott as univocal/multivocal exchanges (Mortimer & Scott, 2003).

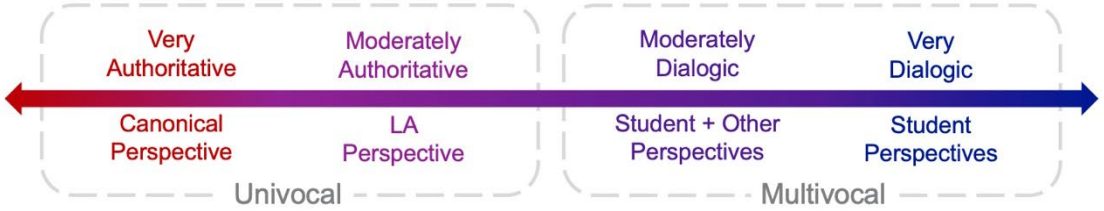

Fig. 2. The Authoritative-to-Dialogic Spectrum, from most univocal to most multivocal with regards to the inclusion of the participating students' perspectives

Findings. Here, we describe four possible perspectives that LAs center when advancing, each falling along our proposed spectrum of authoritative to dialogic (Fig. 2). Two fall on the more authoritative side of the spectrum, and two on the more dialogic side. The first perspective is the canonical perspective. The canonical perspective is authoritative because it centers and privileges one voice, typically delivered by the LA, due to its assumed correctness. Next is the LA's perspective. The LA's perspective is authoritative, because only one person's voice is valued, but it does not claim to be the only or correct voice, which allows for more exploration of ideas during the conversation. The third perspective shifts towards the dialogic end of the spectrum because more than one voice is centered. However, this perspective highlights ideas and voices from outside of the students in the group the LA is interacting with (e.g., other students in class, the problem's answer choices, etc.) when bought into conversation with the voices of students in the group, making it only moderately dialogic. Finally, there is the most dialogic perspective—that of the students participating in the discussion. This is the most dialogic because it focuses completely on those participating in the dialogue. We will now describe an example of each of these points on the spectrum.

When LAs used authoritative advancing actions, they often took the perspective of canonical correctness to guide their utterances. As a result, many LAs moved student discussion towards a complete and correct answer using hints, directive questions, and corrections. In the following example, a group of chemistry students drew an arrow pushing mechanism for the reaction between H_2SO_5 and H_2O. Within H_2SO_5, they incorrectly drew an arrow from the H to the O rather than from the bond to the O (Fig. 3). The LA noticed that the students incorrectly drew the arrow, specifically noting that the students did not pay attention to the movement of electrons. As a result, she drew their attention to this mistake:

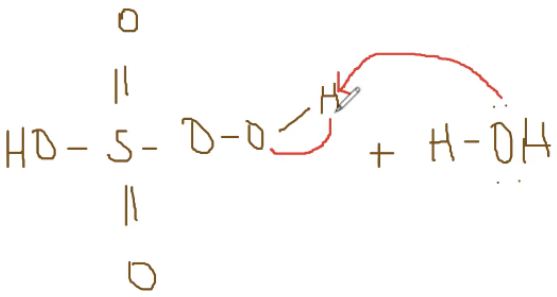

Fig. 3. Students drew an incorrect arrow pushing mechanism.

<u>LA Keap:</u> Where, like between the O and the H, where are the electrons that bind those two like atoms?

Here, LA Keap hinted to the students that they should correct their arrow pushing mechanism by referencing ideas emphasized in class. This action was an advancement towards a different, more canonically correct answer compared to the answer the students had originally. In taking this advancing action, the LA narrowed the scope of the conversation such that there was limited space to explore other ideas.

While this example shows LA Keap intentionally adopting the canonically correct perspective in her questioning to move the students toward a correct answer, the following example shows an LA focusing the conversation on their own perspective without hinting at a correct answer. In this example, a group of physics students discussed the prompt "The earth pulls down on me and the floor pushes up on me. Must those forces be equal and opposite?" By the time LA Aadegil joined the conversation, the students, Alice, Max and Cat, appeared to have reached a consensus on their answer:

> *Alice: We said that, um, we said yes, because in order for us to like not feel some sort of like movement or like force against us, it would have to be equal to like be keeping us along the floor, like keeping us in the same spot. And like the forces would have to cancel out so that we wouldn't move.*
> *Max: And with every force exerted from one object onto another, a matching force is exerted back in the opposite direction. And if the only two things interacting are like you, your body, and the ground, then it's just like back and forth.*
> *Cat: Yeah. And I was just relating that to like how when we're walking on earth, we don't really feel the effect of gravity necessarily. And so, but like we do know that it exists, and we know that there is a force coming down on us. So that force must be experiencing a force back at it from the ground like the normal force to cancel it out. So that's like, that's how I kind of reasoned that.*

In his interview, LA Aadegil talked about how he noticed that the students settled on an answer. He wanted to challenge the basis of the students' answer not because of its canonical correctness but rather because of them having converged on one answer, so he asked them about a more complex scenario:

> *LA Aadegil: Yeah. I think you guys have parsed this pretty well, and you have like of course your lived experience, and then you brought up Newton's third law, Max, which is, I think, one of the, a big thing here. So my question to you guys is, so earth, the gravitational force of earth is coming from where?*
> *Alice: Um, the core?*
> *Max: Yeah.*
> *LA Aadegil: So does it make a difference that, like, does it make a difference to you guys that you're not interacting with where the force is coming from, if that makes sense? So like if each, like you're saying, each force is a polar opposite force between two objects, right?*
> *Alice: Hmm hmm.*
> *LA Aadegil: So, but if I'm on like, like right now I'm on the 4th floor of a building. The force between me and the floor, is that, do you still say that's the polar opposite to the force of the earth and the core, even though like I'm not standing on the ground level?*

Together, these utterances constituted the LA's attempt to advance the conversation to a more refined answer. As he stated in his interview, his actions were driven by his desire to challenge the students. Therefore, in contrast to Keap's very authoritative advancing guided by the canonical perspective, this example illustrates moderately authoritative advancing guided by the LA's perspective.

Other interactions showed LAs similarly aiming to challenge student ideas by using ideas from other outside sources. For example, in many of the classes in our study, student groups summarized their small group discussions on online discussion boards during lecture. LAs sometimes used perspectives posted by groups other than the group they were interacting with and brought those additional outside ideas into the discussion. Additionally, some LAs brought in other outside ideas by referencing an answer choice other than the one their student group picked for a given problem. Because these actions included multiple voices and ideas, we consider them dialogic. However, since they did not rely solely on the voices and ideas of students present in the discussion, we categorize them as moderately dialogic. In the following example, a group of physics students determined the direction of the acceleration vector of a ball speeding up in circular motion. They were given four answer choices, and the student Piper described their answer as follows:

> *Piper: We were talking about just how the acceleration values would always point radially inwards, and so that, the acceleration for this ball should have the arrow pointing towards the center and starting out where the ball is.*

Like Aadegil, LA Catherine recognized that the students agreed to an answer quickly and wanted to challenge the students' answer—specifically mentioning in her interview that she wanted them to consider more perspectives than the one they agreed to. Thus, she responded with:

> *LA Catherine: That makes a lot of sense. What would you think to somebody who said number 3? [the vector tangent to the circle]*

Catherine advanced the conversation by opening the conversation to include multiple ideas that may further develop student thinking. Unlike LA Aadegil, who asked questions from his perspective to make the discussion more challenging, LA Catherine challenged the students by asking them to consider the point of view of somebody who selected a different answer choice and respond to that person. This question did not hint towards the correct answer but instead encouraged diverse ideas. In fact, the LA admitted in her interview that she did not think about the question enough to determine a correct answer.

Though Catherine's dialogic advancing opened the conversation to more perspectives, she still did so in a way that shifted attention away from the students in the group. Even more dialogic advancing action opened the conversation to include multiple perspectives introduced by the students rather than the LA. Often, these actions involved LAs asking students to elaborate or justify their own answers such that they independently develop a more advanced argument for their answers. LAs also encouraged students to continue thinking using their own perspectives, as shown in the following example. Here, a group of students discussed how the electric potential energy and charge of a capacitor changes when its plates are separated. One student, Cheki, voiced a confusion about the purpose of a battery, something that was brought up in the group multiple times:

> *Cheki: This one confused me, cause this one's going back to the battery's still connected for the whole time. But there could be other one, I don't, yeah, it was disconnected on the other one. And the fact that each question specifies whether or not the battery's still connected leads me to believe that that definitely changes something. For this, I believe I said that charge stayed the same, and then electric potential would increase, and I think the electric potential would increase for the same reason that we were thinking about for the one I put before this. But then I didn't see why charged would change. But also for like the voltage of the capacitor, if it's still connected to the battery, I don't see why that would change. So maybe they do both stay the same and I agree with [inaudible]. That's why I was confused. Is it still being connected to the battery aspect of it?*

As stated in her interview, noticing that this idea was brought up but never addressed by the whole group, the LA tried to flesh out the ideas the students had about this confusion:

> *LA Rose: Yeah. So what is your, do you have an idea of what the battery might be, like, contributing, or are you just not sure? When you were thinking through this, did you have kind of an intuition? Or anyone can answer that.*

Here, LA Rose recognized that Cheki was thinking about the conceptual aspects of the problem—what a battery does and how that will affect the capacitor—which gave her the opportunity to discuss the students' intuitions about the problem. In discussing these ideas, she advanced the conversation by encouraging students to use their intuitions to address the confusion. This utterance was dialogic because LA Rose gave space for students to continue conversation and solve problems together using their own ideas, giving room for multiple points of view. This example is similar to the first dialogic example in that both LA utterances foregrounded student ideas in a broad and open way; the example contrasts with the authoritative examples of LA Keap and LA Aadegil, where correct or more complex ideas came from the LA in the form of closed questions that centered particular ideas. What differentiates the interaction of LA Rose from the moderately dialogic utterance of LA Catherine is that Rose advanced the conversation using the ideas of the students in

the participating group instead of ideas of students outside the group. Thus, Rose's interaction is the most dialogic on the spectrum with regards to the inclusion of the participating students' perspectives.

Limitations: Like any analytical approach, the perspectives approach towards authority and dialogicity does not capture all aspects that can shift an LA action to be perceived by students as more or less authoritative or dialogic. For example, things that indicate authority/dialogicity in a more colloquial sense like tone of voice, classroom rules/expectations, and personal dynamics such as friendships between LAs and students may also influence how students interpret LA actions.

Contribution and General Interest. The development of an authoritative-to-dialogic spectrum of advancing moves adds to the existing FAEM as well as the existing conceptualization of authoritativeness and dialogicity (Dini et al., 2020; Mortimer & Scott, 2003). We display four perspectives that instructors may take to challenge student thinking. The authoritative, univocal perspectives may be used for the advancement of student thinking in a canonical sense. Authoritative perspectives may also challenge students' thinking about a particular topic without prioritizing a correct answer. The dialogic, multivocal perspectives may be used to encourage diversity of ideas and prioritize students' approaches to problem solving. This can be done using ideas from others in the classroom or using ideas from the participating student group. This work, applicable to multiple scientific disciplines and instructors, can be used by instructors to intentionally move between more authoritative and more dialogic discourse based on their intentions and learning goals. Furthermore, the use of this spectrum may ease the difficult transition towards more dialogic practices in classrooms. This transition is especially important in the movement towards universal scientific literacy, as dialogic approaches may foster equitable and asset-based teaching practices by encouraging both instructors and students to value and develop student thinking.

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