We are continuing development of the survey by conducting cognitive interviews with student focus groups and using an observation protocol to fully characterize instances of formative assessment based on the initiation of the assessment, the student response, and the instructor response.

### Background

- **Studio classrooms**: Students sit in small groups at fixed tables instead of in front-facing rows [4-6].
- **Conflicting evidence**: Teaching lecture-based classes in studio classrooms...
  - Encourages instructors to adopt more student-centered pedagogy [7-11].
  - Has negative effects on student learning outcomes [10].
- **Flexible classrooms**: Easily reconfigured between front-facing rows (like a typical lecture hall) and small groups (like a studio classroom).
  - Effects on faculty teaching and student learning have not been rigorously examined [6,11-13].

### Conceptual Model and Research Questions

1. How does instructors' pedagogy differ between a traditional lecture hall and a flexible classroom?
2. How do instructors take advantage of the instructional affordances of a flexible classroom?
3. How does the classroom influence the ways students frame (interpret) and engage in group learning activities?

### Classroom Observation Protocol

- We have developed an observation protocol to fully characterize instances of formative assessment based on the initiation of the assessment, the student response, and the instructor response.
- **Formative Assessment**: Initiation.
  - Instructor Asks Student(s) Question.
  - Student Asks Instructor Question.
- **Cognitive Orientation**: Task production or knowledge construction.
  - Response to Student Answer: Affirmative; Neutral; Corrective, direct; or Corrective, facilitative.
- **Instructor Tone**: Inviting, Uninviting, No-Instructor Invitation.
  - Invited by Instructor? Yes or No.
  - Instructor Tone: Inviting, Uninviting, No-Instructor Invitation.
- **Student Asks Instructor Question**.

### Survey Section

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### References

1. Gorguze Family Laboratory.
2. 48-student capacity.
3. 84-student capacity.
4. How would you arrange the tables in 224 GFL?
5. Read a story and watch a short video from Michigan Libraries.
6. Flexible Classroom Spaces at U-M.
7. 224 Gorguze Family Laboratory.
8. 133 Chrysler Center.

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**Impact of Flexible Classroom Spaces on Instructor Pedagogy and Student Behavior**

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