

# Supplemental Material

*CBE—Life Sciences Education*

Downing *et al.*

Supplemental materials for  
*Fear of negative evaluation and student anxiety in community college  
active learning science courses*

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## Copy of survey questions

Do you plan to attend a 4-year institution after community college?

- Yes
- No

I most closely identify as

- Female
- Male
- Other
- Decline to state

I most closely identify as

- First generation college student whose parents' highest level of education is a high school diploma or less
- First generation college student (at least one parent has some college)
- Non-first generation college student (at least one parent has finished college)
- Decline to state

I most closely identify as

- American Indian or Alaska Native
- Asian
- Black or African American
- Hispanic, Latino, or Spanish origin
- Pacific Islander
- White/Caucasian
- Other (please describe)
- Decline to state

Do you serve as a primary caregiver for someone other than yourself? (e.g., children, sick parent, other dependents)

- Yes
- No
- Decline to state

Please indicate the average number of hours you plan to work a job per week during the spring 2019 semester.

- I do not work
- 1 – 10 hours
- 11 – 20 hours
- 21 – 30 hours
- 31 – 40 hours
- More than 40 hours
- Decline to state

Please write in your current major or planned major:

## Copy of Generalized Anxiety Disorder Scale (GAD-7)

*The response options to all questions are: 0 = Not at all, 1 = several days, 2 = over half the days, 3 = nearly every day.*

Over the last 2 weeks, how often have you been bothered by the following problems?

1. Feeling nervous, anxious, or on edge
2. Not being able to stop or control worrying
3. Worrying too much about different things
4. Trouble relaxing
5. Being so restless that it's hard to sit still
6. Becoming easily annoyed or irritable
7. Feeling afraid as if something awful might happen

Scoring:

< 5: Minimal generalized anxiety

5–9: Mild generalized anxiety

10–14: Moderate generalized anxiety

≥ 15: Severe generalized anxiety

## Reference

Spitzer, R. L., Kroenke, K., Williams, J. B., & Löwe, B. (2006). A brief measure for assessing generalized anxiety disorder: the GAD-7. *Archives of internal medicine*, 166(10), 1092-1097.

## Copy of final interview transcript

1. In general, to what extent do you frequently feel anxious?

*If there is a sign of anxiety:*

- a. Can you describe what you feel physically when you feel anxious?
- b. How do you manage your anxious feelings?

2. In your community college science courses, what aspects of those courses, if any, increase your feelings of anxiousness? (question repeated until student identifies no more aspects)

Given \_\_\_\_\_

- a. Can you describe to me how you feel physically when that happens?
- b. Do you feel anxious in that moment, or do you feel anxious for a longer period of time?
- c. Does feeling anxious in that situation influence your future experiences in the class? If so, how?
- d. What about that situation could be changed to make you feel less anxious?
- e. What is the worst case scenario in that situation?

3. In your community college science courses is there anything that could **decrease** your feelings of anxiousness? (question repeated until student identifies no more aspects)

4. In your community college science courses that are taught in an active learning way, such as BIO \_\_\_\_, is there anything that could **increase** your feelings of anxiousness? (question repeated until student identifies no more aspects)

5. In your community college science courses that are taught in an active learning way, such as BIO \_\_\_\_, is there anything that could **decrease** your feelings of anxiousness? (question repeated until student identifies no more aspects)

*Have you ever had a college science instructor use technology in the classroom (for example, clicker questions or Kahoot!)? Y/N. If Y:*

6. In your science courses, can you think of any **aspects of technology in the classroom** that **increase** your feelings of anxiousness?

7. In your science courses, can you think of any **aspects of technology in the classroom** that **decrease** your feelings of anxiousness?

*Now I want to ask about group work. When I say group work I'm talking about working with at least one other person during your college science class.*

*Have you ever had a college science instructor ask you to work in groups during class? Y/N. If Y:*

8. In your community college science courses, are there **aspects of the group work** that **increase** your feelings of anxiousness?
9. In your community college science courses, are there **aspects of the group work** that **decrease** your feelings of anxiousness?

*Have you ever experienced an instructor who calls on students who don't volunteer? Y/N. If Y:*

*Can you describe how they did that?*

10. Considering your experience in your community college science courses, are there aspects of *instructors calling on students who don't volunteer* that **increase** your feelings of anxiousness?
11. Considering your experience in your community college science courses, are there aspects of *instructors calling on students who don't volunteer* that **decrease** your feelings of anxiousness?
12. **For any student who has talked about feeling judged.**

Do you think you perform better or worse when you feel like you are being judged?  
Please explain.

13. To what extent do think feeling anxiousness influences your performance in your science courses? Please explain.
14. Traditional lecture courses are defined as courses where the instructor is just talking at students and students are just listening. Can you compare and contrast your experience in active learning classes to your experience in traditional lecture classes considering your feelings of anxiousness?
15. In general, what type of course, traditional lecture or active learning, **increases** your feelings of anxiousness the most? Please explain.
16. Are there any benefits to feeling anxious in your community college science courses?

**Copy of final coding rubric**

| Theme  | Description  |
|--|--|
| <b>Ways in which active learning (AL) can decrease student anxiety</b>   |  |
| AL decreases anxiety because it increases students' perceptions of learning  | Student describes that AL practices decrease feelings of anxiousness because they enhance their ability to learn the material.   |
| AL provides more opportunities to evaluate knowledge   | Student describes that they use AL activities (e.g. clicker questions, group work) to evaluate the extent to which they understand a topic.  |
| AL provides access to opportunities to seek help during class  | Student describes that in AL there are opportunities to get help from either the instructor or from peers. Student often states that this is because there are more times when the instructor is walking around or when students are asked to talk with each other. In this category student is specifically stating that the opportunity to get help decreases anxiousness and not necessarily the actual conversation or help from someone else (this is a separate category: AL allows student to learn from others). |
| AL is hands-on/interactive   | Student explicitly describes that AL is more "hands-on" which helps them learn. This does not include if a student is describing a lab course. This is also separate from if a student describes that AL provides multiple ways of learning (coded as AL provides multiple forms of learning).   |
| AL helps student be more engaged   | Student describes that AL helps them to be more engaged or specifically more engaged with the material during class.   |
| AL allows student to learn from others/ gather other people's opinions/ reinforce their ideas                              | Student describes that during AL they talk with peers which can help them learn by reinforcing their thinking, by introducing a new idea, or by challenging their own thoughts and ideas.  |
| AL provides multiple forms of learning   | Student describes that AL exposes them to different types of teaching or different ways of learning. This includes any mention of learning styles.   |
| Traditional lecture- no evaluative opportunities   | Student describes that in traditional lecture there are no opportunities, besides exams, to evaluate what they know or what they don't know.   |
| Traditional lecture- fewer opportunities to ask questions  | Student describes that during traditional lecture there is a lack of opportunity to ask questions either to the instructor or to other students when they do not understand a concept. Often the student will clarify that they could possibly ask a question, but it would be intimidating or awkward to disrupt the flow of class.   |
| <b>Ways in which active learning can increase student anxiety that are not associated with fear of negative evaluation</b> |  |



|   |  |
|---|--|
| Active learning increases anxiety associated with groups                                      | Student describes a general anxiousness associated with engaging in groupwork exercises in the classroom.  |
| Social loafing  | Student describes that anxiousness during groupwork stems from a fear that other students in the classroom will not contribute fully to the activity or will rely on other members of group to provide answers.  |
| Take away from learning   | Student describes that anxiousness during groupwork stems from a fear that other students in the classroom will not contribute fully to the activity, which prevents them from hearing another students' ideas about a particular topic, which they perceive impedes their learning.   |
| <b>Effect of active learning on student fear of negative evaluation (FNE)</b>                 |  |
| Student describes FNE   | Student describes FNE or a serious concern about being judged by others for what they say in class. FNE is a sense of dread associated with being unfavorably evaluated while participating in a social situation.   |
| Student describes concern about their reputation  | Student describes that they fear negative evaluation because if others perceive them negatively it could impact their social reputation beyond the classroom. Student often implies that people in the classroom might talk with others about them outside of class.   |
| FNE causes a student to second-guess answers  | Student describes that they fear negative evaluation and it causes them to second-guess their answer to a question or how to approach a response.  |
| FNE negatively affects a student's perceptions of their own intelligence                      | Student describes that FNE can cause them to think more poorly of their own intelligence or performance. Student must explicitly state that the FNE causes them to feel like they know less or "are more dumb."  |
| FNE negatively affects a student's ability to think through science questions                 | Student describes that FNE can disrupt their ability to think through a science question. Specifically student often describes thinking about being called on or being judged instead of thinking about the science problem. This category includes if a student describes losing their train of thought or their mind going blank.  |
| FNE negatively affects a student's ability to talk or articulate their thoughts about science | Student describes that FNE can disrupt their ability to articulate their thoughts about science. This can be for two reasons: 1. Student wasn't able to think through the question and therefore cannot talk about their answer or 2. Student was able to think through the question but FNE inhibited their ability to articulate their thoughts. If a student had no time to even realize that there was random call happening and thus had no time to think through the question and didn't have an answer, that is not coded here since the threat was not affecting their cognitive load. |

|   |   |
|---|---|
| FNE motivates students to learn, prepare, or memorize content                     | Student describes that the fear of being negatively evaluated motivates them to learn, study, prepare, or memorize content in hopes that they will not be judged for not knowing something.   |
| <b>Factors that moderate student FNE</b>  |   |
| FNE decreases when knowing others in groups                                       | Student describes that if they know others in their small groups they are less anxious. This often is because they are more comfortable sharing their thoughts about science. This category also includes when students describe that their anxiety is increased when they do not have previously established relationships in their group.   |
| FNE decreases when student encounters an immediate instructor                     | Student describes that increased instructor immediacy, or an increased physical or psychological closeness between the student and the instructor, can decrease their FNE, increase their comfort in the classroom, or increase their willingness to share their thoughts about science. If a student describes that an instructor is walking around class giving students the opportunity to check their knowledge this is coded as "access to opportunities to seek help during class" and is not coded here. |
| FNE decreases when student has advanced notice/ warning that cold call will occur | Student describes that if they are notified that random call or cold call will happen in the future it will decrease their FNE, anxiety, or will make them more comfortable in the classroom. They often describe this gives them necessary time to prepare or to refocus their attention in hopes that they will be adequately prepared to respond and thus not be negatively judged.  |
| FNE decreases when student has the opportunity to think before they share         | Student describes that having a chance to think about the science question before being asked to share their response can decrease their FNE.   |
| FNE decreases when student has opportunities to discuss questions with others     | Student describes that their FNE decreases or would decrease if they had the opportunity to discuss a question with someone else before talking about it. Student often describes this would decrease their FNE because it would decrease their odds of being wrong in front of others or because it distributes the responsibility of a "wrong answer."  |
| FNE decreases when an instructor responds to a student's answer by error framing  | Student describes that how instructors respond to wrong answers to questions can decrease FNE or anxiety. Specifically, student describes some form of error framing or responding to errors as helpful, natural, or useful.  |
| FNE decreases when there is classroom community                                   | Student describes that knowing others in their class broadly or building relationships with other students in class can decrease FNE, decrease their anxiety, or make them more comfortable in the classroom. This is distinct from the comfort of knowing others in groups because it pertains to the larger class.  |
| FNE decreases when  | Student describes that when responses or contributions are  |

|   |   |
|---|---|
| student is anonymous  | anonymous (e.g. like during clicker questions) it decreases FNE or anxiety because they cannot be judged for a response that is not tied to their name.   |
| <b>Why faculty are calling on students when they do not volunteer</b> |   |
| Classroom management  | Student describes that they perceive some instructors use cold call as a classroom management tool. For example, when an instructor uses it to encourage students to pay attention by calling on people who are not paying attention. |
| Intent to incite FNE  | Student describes that they perceive instructors use cold call or random call as a way to make a student feel judged for not knowing the answer to a question.  |
| <b>Miscellaneous</b>  |   |
| Student says they're "not a science person"                           | Student describes that they are not a science person, not interested in science, or are not good at science.  |
| Student likes talking   | Student describes that they like contributing to small group or whole class discussions, that they like answering questions, or that they are always raising their hand in class.   |

**Table S1. Table of interview participant demographics**

| Pseudonym | GAD Score (0-21) | General anxiety level based on GAD score | Class                   | Gender | Race/Ethnicity                 | College generation status |
|-----------|------------------|--|-------------------------|--------|--------------------------------|---------------------------|
| Claire    | 4                | Minimal                                  | Biology - Intro         | Female | Caucasian/White                | First Gen                 |
| Abigail   | 2                | Minimal                                  | Biology - Environmental | Female | Caucasian/White                | Non First Gen             |
| Denise    | 4                | Minimal                                  | Biology - Anatomy       | Female | Caucasian/White                | First Gen                 |
| Joy       | 6                | Mild                                     | Biology – Intro to Phys | Female | American Indian/Alaskan Native | Non First Gen             |
| Jorge     | 2                | Minimal                                  | Biology - Anatomy       | Male   | Hispanic/Latino                | First Gen                 |
| Gabriella | 7                | Mild                                     | Biology - Anatomy       | Female | Hispanic/Latino                | First Gen                 |
| Cory      | 10               | Moderate                                 | Biology - Environmental | Male   | Caucasian/White                | Non First Gen             |
| Hector    | 8                | Mild                                     | Biology - Environmental | Male   | Hispanic/Latino                | Non First Gen             |
| Lisa      | 2                | Minimal                                  | Biology - Plant         | Female | Hispanic/Latino                | First Gen                 |
| Ellie     | 9                | Mild                                     | Biology - Anatomy       | Female | Caucasian/White                | First Gen                 |
| Brittany  | 8                | Mild                                     | Biology - Anatomy       | Female | Caucasian/White                | First Gen                 |
| Penny     | 13               | Moderate                                 | Biology - Environmental | Female | Caucasian/White                | Non First Gen             |
| Bianca    | 12               | Moderate                                 | Biology - Intro         | Female | Hispanic/Latino                | Non First Gen             |
| Antonio   | 0                | Minimal                                  | Biology - Intro         | Male   | Hispanic/Latino                | First Gen                 |
| Linn      | 4                | Minimal                                  | Biology - Anatomy       | Female | Caucasian/White                | Non First Gen             |
| Olivia    | 13               | Moderate                                 | Biology - Environmental | Female | Hispanic/Latino                | Non First Gen             |
| Daniel    | 6                | Mild                                     | Biology - Intro         | Male   | Asian/Pacific Islander         | Non First Gen             |
| Tiffany   | 4                | Minimal                                  | Biology - Anatomy       | Female | Caucasian/White                | Non First Gen             |
| Carmen    | 11               | Moderate                                 | Biology -               | Female | Hispanic/Latino                | First Gen                 |

|         |    |          |                    |        |                        |                  |
|---------|----|----------|--------------------|--------|------------------------|------------------|
|         |    |          | Environmental      |        |                        |                  |
| Melanie | 14 | Moderate | Biology - Anatomy  | Female | Caucasian/White        | First Gen        |
| Grace   | 0  | Minimal  | Biology - Anatomy  | Female | Decline to State       | First Gen        |
| Teresa  | 0  | Minimal  | Biology - Anatomy  | Female | Hispanic/Latino        | First Gen        |
| Heather | 1  | Minimal  | Biology - Anatomy  | Female | Caucasian/White        | Non First Gen    |
| Rebecca | 6  | Mild     | Biology - Anatomy  | Female | Asian/Pacific Islander | Decline to State |
| Cassie  | 6  | Mild     | Biology - Anatomy  | Female | Caucasian/White        | Non First Gen    |
| Yvonne  | 11 | Moderate | Biology - Anatomy  | Female | Black/African American | Non First Gen    |
| Noah    | 10 | Moderate | Intro Bio – Health | Male   | Biracial               | Non First Gen    |
| Laura   | 6  | Mild     | Biology - Anatomy  | Female | Black/African American | Non First Gen    |
| James   | 6  | Mild     | Biology - Anatomy  | Male   | Caucasian/White        | Non First Gen    |

**Table S2. Percent of participants who attended each in-person community college within the district**

| Institution   | % (n)      |
|---|------------|
| Community College 1   | 44.8% (13) |
| Community College 2   | 3.4% (1)   |
| Community College 3   | 6.9% (2)   |
| Community College 4   | 17.2% (5)  |
| Community College 5   | 13.8% (4)  |
| Community College 6   | 13.8% (4)  |
| Community College 7   | 3.4% (1)   |
| Community College 8   | 3.4% (1)   |
| Community College 9   | 3.4% (1)   |
| Students reported attending more than one community college during their time in college, which is why the percentages add to more than 100%. |            |