

Success and Failure

Supplemental Material

CBE—Life Sciences Education

Von der Mehden *et al.*

Supplemental Materials for *Student Perspectives of Success and Failure in Biology*
Lecture: Multifaceted Definitions and Misalignments

B. Von der Mehden, K. Waller, E. Schussler

Table of Contents

Failure and Success Survey	2
“What do Success and Failure look like?” Codebook	6
Figure 1 — Student responses to Success and Failure questions by theme	9
Table 1 — Success code incidence by student sociodemographic characteristics.	10
Table 2 — Failure code incidence by student sociodemographic characteristics.....	12
Table 3 — Binomial Regression AIC information for significant models	14

Failure and Success Survey

1. Please enter your age below.

This survey will ask your thoughts and ideas about failure and success in your biology and chemistry (if enrolled) lectures. None of the information in the survey will be available to your lecture instructors. Your data are completely anonymous and cannot be linked to you in any way.

2. Are you currently enrolled in [the organismal course] or [the cellular course]?

[Organismal]

[Cellular]

The following questions are about your ideas of success and failure in your biology lecture courses. Please think about biology lecture when answering the questions.

3. What does success in your biology lecture course look like for you?

4. What does failure in your biology lecture course look like for you?

5. In classroom settings, are you motivated by achieving success or avoiding failure?

Achieving success

Avoiding failure

A little of both

I'm not sure

Success and Failure

6. In classroom settings, are you motivated by achieving success or avoiding failure?

- Achieving success
- Avoiding failure
- A little of both
- I'm not sure

7. At this point in the semester, what grade do you think you have in your biology lecture course?

- A
- B
- C
- D
- F

8. With which racial/ethnic group(s) do you identify? Choose all that apply

- American Indian or Alaska Native
- Hispanic, Latine, or Spanish origin
- White
- Asian
- Middle Eastern or North African
- Black or African American
- Native Hawaiian or other Pacific Islander

Success and Failure

Another race or ethnicity not listed above (please specify)

9. Have you participated in research in a faculty members lab for at least one semester?

Yes

No

10. Are you the first in your family to go to college?

Yes

I don't know / prefer not to answer

No

11. What year are you in college?

First-Year

Second-year

Third-year

Fourth-year

5th-year or higher

Success and Failure

12. How would you describe your gender identity?

- Man
- Woman
- Genderqueer
- Agender

13. What is your college GPA? (if you are a first-year in your first semester, please select NA)

- 0.00-1.00
- 1.10-2.00
- 2.10-3.00
- 3.10-4.00
- NA

14. What is your major?

- Biology (any concentration)
- Chemistry
- Other/undecided

“What do Success and Failure look like?” Codebook

Question: What does success/failure in your biology lecture course look like to you?

General:

- If a student’s answer is garbled or otherwise incomprehensible, do not code

Index of Codes:

- Attitude
 - Preparation
 - Comprehension
 - Recall
 - Application
 - Pass
 - Excel
 - Assessment
- } Content Acquisition
- } Performance

Codes:

1. *Code:* ATTD

Brief Definition: Attitude

Full Definition: The student talks about confidence, paying attention, failure is when students "give up", fail to care, etc.

When to Use: Use this code if the student describes building confidence, accountability, apathy

Example: “Success in my biology class looks like being very comfortable with the material”

2. *Code:* PREP

Brief Definition: Preparation

Full Definition: Student references some form of preparing/not preparing for the course or an exam

When to Use: Student talks about studying, note-taking, attendance, using homework as a study guide

Example: “Group study sessions and taking notes leads to success in my biology lecture course.”

THEME: CONTENT AQUISION

Description: Student describes learning and or understanding the material

Child Codes Under Content Acquisition:

3. *Code:* COMP

Brief Definition: Comprehension

Full Definition: Student states that success relates to understanding the material OR student references NOT understanding the material as a failure.

When to Use: when students say they want to "learn", being able to explain, understand questions, etc.

Example: "Success in my biology lecture looks like understanding the information and being able to follow what is going on."

4. *Code: RECL*

Brief Definition: Recall

Full Definition: Student states that success is the ability to retain the material that was learned in class, OR student states NOT retaining the material is a failure

When to Use: recall

5. *Code: APP*

Brief Definition: Application

Full Definition: Student states that success is understanding the material or skills learned from the course well enough to be able to apply it in a future situation

When to Use: Could be work, research, another class, etc.

When not to Use: Do not use when student references the material being applied to future exams in the current lecture course.

THEME: PERFORMANCE

DESCRIPTION: Earning a specific grade or linking success or failure to how well/poorly they do

Child Codes Under Performance:

6. *Code: PASS*

Brief Definition: Pass

Full Definition: Student states that success is the ability to simply pass the course. Student states that failure is not passing the course.

When to Use: Student talks about receiving a C or better. Or student talks about not receiving a passing grade (failure), when student references good grade (success) or bad grade (failure)

When not to Use: Do not use when students talk about passing an exam or passing on an assignment. See ASSIG

Example: Success is getting a good grade in the class.

7. *Code: EXCL*

Brief Definition: Excel

Full Definition: Student references that success is the ability to earn a high grade (A or B). OR Student references NOT receiving a high grade as failure (anything lower than an 80%).

When to Use: If a student said failure is earning a C, if a student says success is an A grade in the course

When not to use: When student simply references "doing well" in a course (see PASS). Do not use when students talk about getting above 80% on an exam or on an assignment. See ASSIG

Example: "Obtaining an A in the course."

Success and Failure

8. *Code:* ASSES

Brief Definition: Assessment

Full Definition: Students state that success/failure relates to performance on quizzes or exams

When to use: Only use this is student says success is doing well on exams or assignments, or failure is doing poorly on exams or assignments.

Example: "Doing well on assignments."

Success and Failure

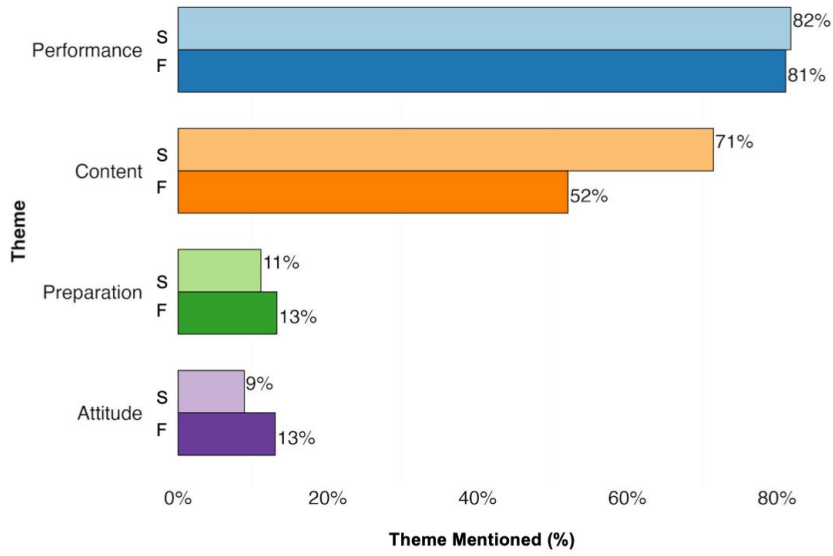


Figure 1 — Student responses to Success and Failure questions by theme. Lighter hues represent Success responses darker hues represent Failure responses.

Success and Failure

Table 1 — Success code incidence by student sociodemographic characteristics. Each percent listed on this table is the number of students that mentioned a code in their success definition divided by the number of students within that sociodemographic categorization multiplied by 100. For example, 138 women mentioned the code 'Pass' out of 647 women in the sample (138/647*100).

	Pass	Excel	Assessment	Recall	Comprehension	Application	Preparation	Attitude
Gender								
Women (n = 647)	21.3	32.0	25.0	4.33	56.6	7.88	10.9	8.66
Men (n = 229)	26.2	36.7	17.9	5.24	48.5	8.73	10.5	7.42
Other (n = 13)	53.8	7.70	23.1	7.70	61.5	23.1	0	23.1
Generation								
1 st Gen. (n = 147)	25.9	27.9	21.8	4.76	57.1	9.52	8.84	5.44
Continuing (n = 725)	22.3	34.5	23.7	4.41	53.7	8.00	11.2	8.69
Year								
First (n = 571)	22.6	32.7	24.2	4.73	56.0	8.23	10.7	8.76
Second (n = 190)	23.2	32.6	24.7	4.21	50.0	7.37	9.47	7.89
Third+ (n = 125)	52.8	34.4	16.8	4.80	55.2	9.60	12.8	8.00
Race								
Asian (n = 62)	14.5	35.5	33.9	3.23	58.1	9.68	3.23	8.06
Black (n = 47)	23.4	19.1	25.5	4.26	53.2	8.51	10.6	6.38
Hispanic or Latine or other Spanish origin (n = 23)	34.8	21.7	4.35	4.35	60.9	4.35	13.0	0
Multiracial	26.2	26.2	27.7	9.23	55.4	15.4	7.69	4.62

Success and Failure

(n = 65)								
	Pass	Excel	Assessment	Recall	Comprehension	Application	Preparation	Attitude
White (n = 668)	23.1	34.7	22.3	4.19	54.0	7.34	11.7	8.83
Course								
Organismal (n = 506)	24.5	30.2	23.1	6.32	53.2	7.71	12.1	9.29
Cellular (n = 383)	21.1	36.3	23.2	2.35	56.4	9.14	8.88	7.57
Major								
Biology (n = 301)	21.6	32.9	23.9	4.32	59.8	8.64	10.3	8.97
Anything other than Biology (n = 588)	23.8	32.8	22.8	4.76	51.8	8.16	10.9	8.33

Success and Failure

Table 2 — Failure code incidence by student sociodemographic characteristics. Each percent listed on this table is the number of students that mentioned a code in their failure definition divided by the number of students within that sociodemographic categorization multiplied by 100. For example, 251 women mentioned the code 'Pass' out of 647 women in the sample (251/647*100).

	Pass	Excel	Assessment	Recall	Comprehension	Application	Preparation	Attitude
Gender								
Women (n = 647)	38.8	16.7	23.8	3.86	46.2	2.01	11.9	12.1
Men (n = 229)	37.1	19.2	16.2	4.80	35.4	3.06	14.8	13.5
Other (n = 13)	46.2	15.4	15.4	0	38.5	7.69	0	7.69
Generation								
1 st Gen. (n = 147)	39.5	13.6	18.4	4.08	47.6	3.40	10.2	9.52
Continuing (n = 725)	38.1	18.3	22.5	3.86	42.3	2.07	12.8	13.0
Year								
First (n = 571)	37.0	17.0	23.5	3.33	45.0	2.28	13.0	13.7
Second (n = 190)	42.6	17.9	20.5	3.68	37.4	1.58	11.1	10.5
Third+ (n = 125)	38.4	18.4	16.0	8.00	45.6	3.20	12.8	9.60
Race								
Asian (n = 62)	50.0	14.5	19.4	8.06	41.9	0	8.06	16.1
Black (n = 47)	46.8	4.26	25.5	8.51	40.4	2.13	10.6	6.38
Hispanic or Latine or other Spanish origin (n = 23)	43.5	8.70	17.4	0	47.8	0	17.4	17.4
Multiracial	38.5	10.8	27.7	7.70	46.2	9.23	12.3	15.4

Success and Failure

(n = 65)								
	Pass	Excel	Assessment	Recall	Comprehension	Application	Preparation	Attitude
White (n = 668)	36.8	19.5	21.3	3.30	43.6	1.95	12.4	11.5
Course								
Organismal (n = 506)	35.8	17.8	21.7	5.14	42.7	2.96	15.0	14.0
Cellular (n = 383)	42.0	16.7	21.7	2.61	44.1	1.57	9.14	10.2
Major								
Biology (n = 301)	37.9	17.9	20.9	3.65	48.2	2.99	13.6	13.0
Anything other than Biology (n = 588)	38.8	17.0	22.1	4.25	40.8	2.04	11.9	12.1

Table 3 — Binomial Regression AIC information for significant models. Δ AIC is the change in AIC from the previous iteration to the final model. AIC had to change by 2 or more to be considered significant.

Final “Success” Models	Δ AIC	Final AIC
Pass ~ Grade + Gender + Course + Major	2.48	879.74
Excel ~ Grade + Gender + Generation + Race + Course + Major	3.70	1042.89
Assessment ~ Grade + Gender + Year + Race + Course + Major	2.04	913.91
Recall ~ Grade + Gender + Generation + Course + Major	3.00	297.64
Comprehension ~ Gender + Course + Major	2.32	1144.97
Preparation ~ Race + Course + Major	2.00	571.5
Final “Failure” Models	Δ AIC	Final AIC
Pass ~ Grade + Gender + Race + Course + Major	2.63	1096.92
Excel ~ Grade + Gender + Race + Course + Major	2.29	751.71
Assessment ~ Grade + Gender + Year + Course + Major	3.09	873.31
Recall ~ Gender + Generation + Year + Race + Course	2.00	298.39
Comprehension ~ Gender + Year + Course + Major	3.42	1137.44
Application ~ Grade + Gender + Generation + Race + Course + Major	2.4	188.99
Preparation ~ Gender + Generation + Course + Major	2.94	615.29