Supplemental Material

CBE—Life Sciences Education

Sato *et al.*

Survey Questions

1. I (DID/DID NOT) complete MLec before taking MLab last quarter.

    -I DID complete MLec before
    -I DID NOT complete MLec before

2. If you completed MLec before MLab, why did you choose to do so? If you did not complete MLec before MLab, why did you not choose to do so?

3. I believe that someone completing MLec prior to enrolling in MLab would earn a higher grade in the lab.

    -Strongly agree
    -Agree
    -Neutral
    -Disagree
    -Strongly Disagree

4. Please explain why you selected your answer for question 3.

5. I believe that in general, someone completing the prerequisite course(s) prior to enrolling in an average Biological Sciences course (course X) would earn a higher grade in course X than someone who did not complete the prerequisite(s).

    -Strongly agree
    -Agree
    -Neutral
    -Disagree
    -Strongly Disagree

6.Would you be willing to sit down with Dr. Sato for 30 minutes to answer a couple questions similar to those above?

Interview Questions

1. Did you take MLec before enrolling inMLab? Why or why not?

2. Did you feel that there would be an advantage to taking MLec before MLab? Before the lab course started? After taking the lab course?

3. MLec is no longer a prerequisite for MLab, should it be?

4. In general, when you register for courses, do you think about prerequisites? How so?

5. In general, what do you think the purpose of prerequisites is? Is this purpose being fulfilled?

6. What are positive and negative aspects of prerequisites?

7. Are there specific instances where you thought a prerequisite was especially helpful for you?

8. Do you have any other general comments about prerequisites or the way our curriculum is structured?

Table S1A. Student's reasons for taking the recommended MLec prerequisite from an online survey

Category	Fraction of surveys with representative comment	Example Quote
Background knowledge	55.9%	"I thought it would give me a greater understanding of the material before actually putting some of the techniques and ideas into application during the lab."
Scheduling	14.7%	"Because it was one of the few biology electives that wasn't full last spring."
Graduate school requirement/Future plans	5.9%	"Course requirement for my future plans in life."
Interest in course	8.8%	"I took microbiology lecture because I thought it would be really interesting."
Thought it was a prerequisite	5.9%	"I thought taking micro lecture was a prerequisite for micro lab..."
Upper division elective	14.7%	"I took the micro lecture course simply as one of my upper division electives two quarters before ever deciding to take micro lab."

Survey responses to the question "Why did you (n = 34 students, Table S1A) or did you not (n = 27, Table S1B) take MLec before enrolling in MLab?".

Table S1B. Student's reasons for not taking the recommended MLec prerequisite from an online survey

Category	Fraction of surveys with representative comment	Example Quote
Not a prerequisite	25.9%	"I chose not to complete it since the prereq for the lab was [Molecular Biology]."
Scheduling	51.9%	"My counselor planned out a schedule for me to follow and lab was offered before the lecture."
No interest in the subject	18.5%	"The [lecture] doesn't interest me, and I've heard the lab is fun."
Prior background	11.1%	"I have a decent background in microbio, and felt confident going into lab that I would do well even without having taken micro lecture."

Tables S2A-F Multiple Regression Analysis Examining Factors Influencing MLab Exam Performance

Table S2A
Familiarity Designated by: Summer Session 1 MLec Instructor

	Estimate (+/- SEM)	P value
Familiarity Category: Very Familiar, r^2 = 0.10		
Intercept	0.34 (0.14)	0.02 *
Ethnicity (Caucasian)	0.07 (0.06)	0.20
Ethnicity (URM)	0.04 (0.05)	0.39
Gender (M)	0.01 (0.04)	0.86
GPA	0.10 (0.04)	0.02 *
MLec (Yes)	-0.00 (0.02)	0.81
Familiarity Category: Familiar, r^2 = 0.30		
Intercept	0.01 (0.14)	0.95
Ethnicity (Caucasian)	0.11 (0.06)	0.04 *
Ethnicity (URM)	-0.05 (0.05)	0.32
Gender (M)	0.07 (0.04)	0.06
GPA	0.18 (0.04)	7.5e-05 ***
MLec (Yes)	-0.03 (0.04)	0.53
Familiarity Category: Not Familiar, r^2 = 0.19		
Intercept	0.16 (0.11)	0.14
Ethnicity (Caucasian)	0.03 (0.04)	0.40
Ethnicity (URM)	-0.01 (0.04)	0.80
Gender (M)	0.05 (0.03)	0.07
GPA	0.11 (0.03)	2.0e-03 **
MLec (Yes)	0.01 (0.04)	0.68

Table S2B
Familiarity Designated by: Summer Session 2 MLec Instructor

	Estimate (+/- SEM)	P value
Familiarity Category: Very Familiar, r^2 = 0.17		
Intercept	0.29 (0.11)	7.1e-03 **

Ethnicity (Caucasian)	0.04 (0.04)	0.27
Ethnicity (URM)	-0.03 (0.04)	0.42
Gender (M)	0.02 (0.03)	0.35
GPA	0.10 (0.03)	2.6e-03 **
MLec (Yes)	0.00 (0.03)	0.90
Familiarity Category: Familiar, r^2 = 0.19		
Intercept	0.15 (0.12)	0.20
Ethnicity (Caucasian)	0.02 (0.44)	0.67
Ethnicity (URM)	0.01 (0.04)	0.83
Gender (M)	0.03 (0.03)	0.26
GPA	0.13 (0.04)	7.1e-04 ***
MLec (Yes)	-0.05 (0.04)	0.13
Familiarity Category: Not Familiar, r^2 = 0.17		
Intercept	0.00 (0.17)	0.98
Ethnicity (Caucasian)	0.03 (0.06)	0.63
Ethnicity (URM)	0.05 (0.06)	0.38
Gender (M)	0.05 (0.04)	0.22
GPA	0.17 (0.05)	1.2e-03 **
MLec (Yes)	-0.06 (0.05)	0.22

Table S2C
Familiarity Designated by: Spring MLec Lecture Slides

	Estimate (+/- SEM)	**P value**
Familiarity Category: Very Familiar, r^2 = 0.21		
Intercept	0.16 (0.16)	0.33
Ethnicity (Caucasian)	-0.06 (0.05)	0.23
Ethnicity (URM)	-0.02 (0.05)	0.65
Gender (M)	-0.05 (0.04)	0.17
GPA	0.17 (0.05)	1.1e-03 **
MLec (Yes)	-0.09 (0.04)	0.02 *
Familiarity Category: Familiar, r^2 = 0.29		

Intercept	0.13 (0.18)	0.47
Ethnicity (Caucasian)	0.11 (0.06)	0.06
Ethnicity (URM)	-0.08 (0.06)	0.20
Gender (M)	-0.05 (0.04)	0.20
GPA	0.19 (0.05)	7.8e-04 ***
MLec (Yes)	-0.02 (0.03)	0.01 *
Familiarity Category: Not Familiar, r^2 = 0.36		
Intercept	0.05 (0.11)	0.62
Ethnicity (Caucasian)	0.06 (0.03)	0.10
Ethnicity (URM)	-0.05 (0.04)	0.15
Gender (M)	0.04 (0.02)	0.13
GPA	0.16 (0.03)	1.3e-05 ***
MLec (Yes)	0.02 (0.02)	0.50

Table S2D
Familiarity Designated by: Summer Session 1 MLec Lecture Slides

	Estimate (+/- SEM)	**P value**
Familiarity Category: Very Familiar, r^2 = 0.07		
Intercept	0.44 (0.13)	1.6e-03 **
Ethnicity (Caucasian)	0.02 (0.05)	0.65
Ethnicity (URM)	-0.02 (0.04)	0.61
Gender (M)	0.02 (0.03)	0.47
GPA	0.07 (0.04)	0.08
MLec (Yes)	0.01 (0.04)	0.79
Familiarity Category: Familiar, r^2 = 0.20		
Intercept	0.05 (0.15)	0.72
Ethnicity (Caucasian)	0.06 (0.06)	0.29
Ethnicity (URM)	0.03 (0.05)	0.57
Gender (M)	0.04 (0.04)	0.27
GPA	0.16 (0.05)	6.9e-04 ***
MLec (Yes)	0.04 (0.05)	0.43
Familiarity Category: Not Familiar, r^2 = 0.26		

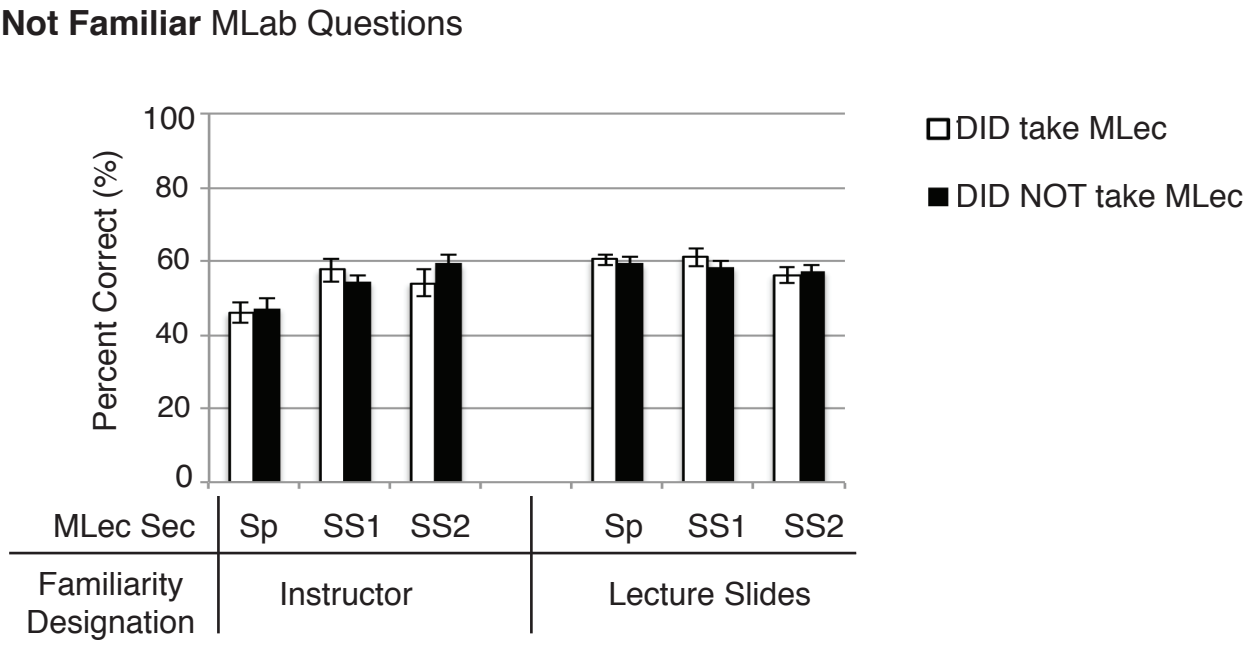
Intercept	0.16 (0.04)	0.12
Ethnicity (Caucasian)	0.05 (0.04)	0.17
Ethnicity (URM)	-0.01 (0.03)	0.69
Gender (M)	0.05 (0.03)	0.06
GPA	0.12 (0.03)	1.9e-04 ***
MLec (Yes)	0.01 (0.03)	0.87

Table S2E
Familiarity Designated by: Summer Session 2 MLec Lecture Slides

	Estimate (+/- SEM)	**P value**
Familiarity Category: Very Familiar, r^2 = 0.03		
Intercept	0.69 (0.24)	4.4e-03 **
Ethnicity (Caucasian)	-0.05 (0.09)	0.54
Ethnicity (URM)	-0.03 (0.08)	0.74
Gender (M)	0.06 (0.06)	0.32
GPA	-0.02 (0.07)	0.79
MLec (Yes)	-0.05 (0.07)	0.41
Familiarity Category: Familiar, r^2 = 0.10		
Intercept	0.27 (0.14)	0.05
Ethnicity (Caucasian)	-0.02 (0.05)	0.71
Ethnicity (URM)	0.00 (0.05)	0.98
Gender (M)	0.01 (0.03)	0.78
GPA	0.12 (0.04)	5.5e-03 **
MLec (Yes)	0.02 (0.04)	0.65
Familiarity Category: Not Familiar, r^2 = 0.17		
Intercept	0.10 (0.10)	0.31
Ethnicity (Caucasian)	0.08 (0.03)	0.03
Ethnicity (URM)	0.00 (0.03)	0.96
Gender (M)	0.03 (0.02)	0.19
GPA	0.14 (0.03)	7.2e-06 ***
MLec (Yes)	-0.03 (0.03)	0.35

Summary data from fifteen independent multiple regression models of MLab exam question performance on Very Familiar (VF), Familiar (F), and not familiar (NF) questions analyzed in the context of student demographics, including GPA (on a 4.0 scale), ethnicity (Caucasian, Asian or URM – African American or Hispanic), Gender (male or female), and MLec completion (yes or no). The baseline variables for the models are Asian, Female, and No MLec. Familiarity was designated by either MLec lecture slides or instructors. The estimate highlights the increase or decrease in scores (out of 100% presented in decimal form) for students based on the indicated factors. Data were combined for students in Fall 2014 MLab and Winter 2015 MLab sections. The estimate, standard error of the mean, and p values are indicated for each comparison of these comparisons. The three models looking at VF, F, and NF exam performance with familiarity designated by the Spring MLec instructor can be found as Table 4. *$p<0.05$, **$p<0.01$, ***$p<0.001$

Figure S1


Not Familiar MLab Questions
Percent Correct (%)
100
80
60
40
20
0
DID take MLec
DID NOT take MLec
MLec Sec
Sp
SS1
SS2
Sp
SS1
SS2
Familiarity Designation
Instructor
Lecture Slides