2018 Perceived Math Self-Efficacy Survey (PMSES)

May 2018 Institutional Analytics & Research (IAR)

Draft 1.00



Introduction

The Perceived Math Self-Efficacy Survey (PMSES) was developed by the FSCJ faculty of mathematics to gauge student perceptions of skills and abilities regarding applied math principles and concepts. The survey was deployed between 3/29/18 and 5/1/18 to 7,491 students. Student selection was based on fall 2017 enrollment in any of 15 mathematics courses that included (1) BASIC MATHEMATICS (MAT0018), (2) ELEMENTARY ALGEBRA (MAT0028), (3) INTERMEDIATE ALGEBRA (MAT1033), (4) TOPICS IN COLLEGE MATH (MGF1106), (5) EXPLORATIONS IN MATH (MGF1107), (6) COLLEGE ALGEBRA (MAC1105), (7) COLLEGE TRIGONOMETRY (MAC1114), (8) PRECALCULUS ALGEBRA (MAC1140), (9) PRECALCULUS ALGEBRA/TRIG (MAC1147), (10) CALCULUS WITH ANALYTIC GEOM I (MAC2311), (11) CALCULUS WITH ANALYTIC GEO II (MAC2312), (12) CALCULUS WITH ANALYTIC GEO III (MAC2313), (13) DIFFERENTIAL EQUATIONS (MAP2302), (14) ELEMENTARY STATISTICS (STA2023), and (15) CALCULUS FOR BUSINESS/SOCIAL SCI (MAC2233). As of 5/1/18, a total of 1,470 students (20%) completed the survey. This analysis contains both aggregated (overall) and disaggregated survey results broken down by course type (STEM, non-STEM, Developmental) and student demographics (age, race/ethnicity, gender).



Question 1 Overall Results

Indicate how confident you feel about correctly doing the following mathematics tasks.

Table 1. Overall Results for PMSES Question 1

Q1: Indicate how confident you feel about correctly doing the following mathematics tasks.	Mean	Valid N
Calculating the price of a TV after a 30% discount	3.30	1470
Calculating how many square feet of tile you need to cover a floor	3.02	1470
Understanding a graph presented online or in a newspaper	3.39	1470
Solving an equation like 3x + 5 = 17	3.71	1470
Sketching a graph of a linear function	3.08	1470
Calculating the average of 4 exam grades	3.51	1470
Sketching the graph of a nonlinear function such as f(x) = (x-3)^2 + 1	2.63	1470
Calculating the amount of money in an account where interest is compounded continuously	2.78	1470
Solving an equation like x^2 - 4x + 6 = 0	3.16	1470
Understanding the meaning of a 1 in 175,223,510 probability of winning the Powerball lottery jackpot.	3.00	1470

Spring 2018^a

a. Response Scale: 1 = not confident; 2 = somewhat confident; 3 = confident; 4 = very confident



Q1: Indicate how confident you feel about correctly doing the following mathematics tasks.

All Respondents





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Indicate how confident you feel about correctly doing the following mathematics tasks.

Table 2. PMSES Question 1 Results by Student Gender

	Indicate your gender.					
	ma	ale	fem	ale		
Q1: Indicate how confident you feel about correctly doing the following mathematics tasks.	Mean	Valid N	Mean	Valid N		
Calculating the price of a TV after a 30% discount	3.45a	504	3.22b	796		
Calculating how many square feet of tile you need to cover a floor	3.23a	504	2.88b	796		
Understanding a graph presented online or in a newspaper	3.52a	504	3.35ь	796		
Solving an equation like 3x + 5 = 17	3.76a	504	3.70a	796		
Sketching a graph of a linear function	3.21 a	504	3.01ь	796		
Calculating the average of 4 exam grades	3.59a	504	3.48ь	796		
Sketching the graph of a nonlinear function such as $f(x) = (x-3)^2 + 1$	2.73a	504	2.57ь	796		
Calculating the amount of money in an account where interest is compounded continuously	2.94a	504	2.66ь	796		
Solving an equation like x^2 - 4x + 6 = 0	3.25a	504	3.14a	796		
Understanding the meaning of a 1 in 175,223,510 probability of winning the Powerball lottery jackpot.	3.24a	504	2.89b	796		

Spring 2018^{1,2,3}

1. Note: Values in the same row and subtable not sharing the same subscript are significantly different at p< .05 in the two-sided test of equality for column means. Cells with no subscript are not included in the test. Tests assume equal variances.

2. Tests are adjusted for all pairwise comparisons within a row of each innermost subtable using the Bonferroni correction.

3. Response Scale: 1 = not confident; 2 = somewhat confident; 3 = confident; 4 = very confident



Q1: Indicate how confident you feel about correctly doing the following mathematics tasks.



Indicate how confident you feel about correctly doing the following mathematics tasks.

Table 3. PMSES Question 1 Results by Student Age Category

01: Indicate how confident you feel	Indicate your age category.											
about correctly doing the following	under 18		18 to	18 to 24		25 to 34		35 to 44		54	over 55	
mathematics tasks.	Mean	Valid N	Mean	Valid N	Mean	Valid N	Mean	Valid N	Mean	Valid N	Mean	Valid N
Calculating the price of a TV after a 30% discount	3.25a,b	87	3.22a	762	3.45b,c	241	3.64c	124	3.39a,b,c	70	3.06a,b,c	16
Calculating how many square feet of tile you need to cover a floor	3.09a,b	87	2.89a	762	3.23b	241	3.26b,c	124	3.11a,b	70	3.19a,b	16
Understanding a graph presented online or in a newspaper	3.36a	87	3.39a	762	3.45a	241	3.55a	124	3.39a	70	3.38a	16
Solving an equation like 3x + 5 = 17	3.77a	87	3.77a	762	3.70a	241	3.68a	124	3.40ь	70	3.31 a,b	16
Sketching a graph of a linear function	3.16a,b	87	3.15a	762	3.08a,b	241	2.90a,b	124	2.74ь	70	2.63a,b	16
Calculating the average of 4 exam grades	3.62a	87	3.50a	762	3.53a	241	3.58a	124	3.56a	70	3.31 a	16
Sketching the graph of a nonlinear function such as f(x) = (x-3)^2 + 1	2.72a	87	2.67a	762	2.76a	241	2.40a,b	124	2.17ь	70	2.19a,b	16
Calculating the amount of money in an account where interest is compounded continuously	2.64a	87	2.70a	762	2.91 a	241	2.99a	124	2.79a	70	2.94a	16
Solving an equation like x^2 - 4x + 6 = 0	3.34a	87	3.26a	762	3.24a	241	2.85b	124	2.67ь	70	2.38ь	16
Understanding the meaning of a 1 in 175,223,510 probability of winning the Powerball lottery jackpot.	2.80a	87	3.01 a	762	3.10a	241	3.11a	124	3.13a	70	2.88a	16

Spring 2018^{1,2,3}

1. Note: Values in the same row and subtable not sharing the same subscript are significantly different at p<.05 in the two-sided test of equality for column means. Cells with no subscript are not included in the test. Tests assume equal variances.

2. Tests are adjusted for all pairwise comparisons within a row of each innermost subtable using the Bonferroni correction.

3. Response Scale: 1 = not confident; 2 = somewhat confident; 3 = confident; 4 = very confident





Response Scale: 1 = not confident; 2 = somewhat confident; 3 = confident; 4 = very confident. See separate table for statistically significant differences between categories. Source: 2018 FSCJ PMSES. Contact Institutional Analytics & Research (IAR)



jackpot.

continuously

Question 1 by Student Race and Ethnicity

Indicate how confident you feel about correctly doing the following mathematics tasks.

Table 4. PMSES Question 1 Results by Student Race and Ethnicity

01: Indianto haw confident you feel	Race/Ethnicity Group										
about correctly doing the following	Bla	ick	Wh	iite	Hisp	anic	Multir	racial	Oth	ier	
mathematics tasks.	Mean	Valid N	Mean	Valid N	Mean	Valid N	Mean	Valid N	Mean	Valid N	
Calculating the price of a TV after a 30% discount	3.08a	292	3.40ь	692	3.23a,b	104	3.51ь	98	3.24a,b	114	
Calculating how many square feet of tile you need to cover a floor	2.68a	292	3.20ь	692	2.85a,c	104	3.12b,c,d	98	2.86a,d	114	
Understanding a graph presented online or in a newspaper	3.13a	292	3.56ь	692	3.31 a.c	104	3.50b,c,d	98	3.29a,d	114	
Solving an equation like 3x + 5 = 17	3.62a	292	3.77ь	692	3.76a,b	104	3.76a,b	98	3.63a,b	114	
Sketching a graph of a linear function	2.85a	292	3.16ь	692	2.99a,b	104	3.20ь	98	3.23b	114	
Calculating the average of 4 exam grades	3.35a	292	3.62ь	692	3.37a	104	3.59a,b	98	3.43a,b	114	
Sketching the graph of a nonlinear function such as f(x) = (x-3)^2 + 1	2.50a	292	2.65a,b	692	2.59a,b	104	2.70a,b	98	2.86b	114	
Calculating the amount of money in an account where interest is compounded continuously	2.57a	292	2.85ь	692	2.60a,b	104	2.88a,b	98	2.87a,b	114	
Solving an equation like x^2 - 4x + 6 = 0	2.95a	292	3.26ь	692	3.16a,b	104	3.18a,b	98	3.33ь	114	
Understanding the meaning of a 1 in 175,223,510 probability of winning the Powerball lottery jackpot.	2.71 a	292	3.17ь	692	2.94a,b	104	3.06ь	98	3.02a,b	114	

Spring 2018 1,2,3

1. Note: Values in the same row and subtable not sharing the same subscript are significantly different at p< .05 in the two-sided test of equality for column means. Cells with no subscript are not included in the test. Tests assume equal variances.

2. Tests are adjusted for all pairwise comparisons within a row of each innermost subtable using the Bonferroni correction.

3. Response Scale: 1 = not confident; 2 = somewhat confident; 3 = confident; 4 = very confident





differences between categories. Source: 2018 FSCJ PMSES. Contact Institutional Analytics & Research (IAR)



Question 1 by Student Degree or Award Sought

Indicate how confident you feel about correctly doing the following mathematics tasks.

Table 5. PMSES Question 1 Results by Student Degree/Award

		Which of the following best describes the award that you are currently working to complete?										
Q1: Indicate how confident you feel about correctly doing the following	Associate Degree AAS	e (e.g., AA, AS,)	Bachelor's Degr BAS, B	Bachelor's Degree (e.g., BS, BAS, BSN)		Technical Certificate or Advanced Technical Certificate			Not Applicable			
mathematics tasks.	Mean	Valid N	Mean	Valid N	Mean	Valid N	Mean	Valid N	Mean	Valid N		
Calculating the price of a TV after a 30% discount	3.25a	1042	3.60b	213	2.86a,b	7	3.00a,b	3	3.37a,b	35		
Calculating how many square feet of tile you need to cover a floor	2.97a	1042	3.27b	213	2.43a,b	7	2.67a,b	3	3.03a,b	35		
Understanding a graph presented online or in a newspaper	3.39a	1042	3.58b	213	3.14a,b	7	3.00a,b	3	3.26a,b	35		
Solving an equation like 3x + 5 = 17	3.72a	1042	3.80a	213	2.86ь	7	3.00a,b	3	3.74a	35		
Sketching a graph of a linear function	3.07a	1042	3.16a	213	2.29a	7	2.67a	3	3.23a	35		
Calculating the average of 4 exam grades	3.49a	1042	3.69ь	213	3.43a,b	7	3.00a,b	3	3.46a,b	35		
Sketching the graph of a nonlinear function such as f(x) = (x-3)^2 + 1	2.62a	1042	2.74a	213	2.43a	7	2.67a	3	2.63a	35		
Calculating the amount of money in an account where interest is compounded continuously	2.73a	1042	2.96b	213	3.00a,b	7	4.00a,b	3	2.71a,b	35		
Solving an equation like x^2 - 4x + 6 = 0	3.15a	1042	3.32a	213	3.00a	7	3.00a	3	3.40a	35		
Understanding the meaning of a 1 in 175,223,510 probability of winning the Powerball lottery jackpot.	2.98a	1042	3.25ь	213	2.86a,b	7	3.00a,b	3	3.06a,b	35		

Spring 2018^{1,2,3}

1. Note: Values in the same row and subtable not sharing the same subscript are significantly different at p<.05 in the two-sided test of equality for column means. Cells with no subscript are not included in the test. Tests assume equal variances.

2. Tests are adjusted for all pairwise comparisons within a row of each innermost subtable using the Bonferroni correction.

3. Response Scale: 1 = not confident; 2 = somewhat confident; 3 = confident; 4 = very confident



Q1: Indicate how confident you feel about correctly doing the following mathematics tasks.

Associate Degree (e.g., AA, AS, AAS) Technical Certificate or Advanced Technical Certificate Not Applicable

Bachelor's Degree (e.g., BS, BAS, BSN) □ Workforce Certificate



significant differences between categories. Source: 2018 FSCJ PMSES. Contact Institutional Analytics & Research (IAR)



5.00

Question 1 by Math STEM Course Classification Category

Indicate how confident you feel about correctly doing the following mathematics tasks.

Table 6. PMSES Question 1 Results by STEM Course Classification Category

	STEM Category*								
Q1: Indicate how confident you feel about correctly	Dev	DevEd		Non-STEM		EM	To	tal	
doing the following mathematics tasks.	Mean	Valid N	Mean	Valid N	Mean	Valid N	Mean	Valid N	
Calculating the price of a TV after a 30% discount	3.11a	545	3.40b	615	3.65c	153	3.31	1313	
Calculating how many square feet of tile you need to cover a floor	2.87a	545	3.03ь	615	3.50c	153	3.02	1313	
Understanding a graph presented online or in a newspaper	3.28a	545	3.45ь	615	3.70c	153	3.41	1313	
Solving an equation like 3x + 5 = 17	3.66a	545	3.73a	615	3.91ь	153	3.72	1313	
Sketching a graph of a linear function	2.92a	545	3.07ь	615	3.75c	153	3.09	1313	
Calculating the average of 4 exam grades	3.33a	545	3.61ь	615	3.84c	153	3.52	1313	
Sketching the graph of a nonlinear function such as f(x) = (x-3)^2 + 1	2.46a	545	2.61 a	615	3.41ь	153	2.64	1313	
Calculating the amount of money in an account where interest is compounded continuously	2.66a	545	2.79a	615	3.11ь	153	2.77	1313	
Solving an equation like x^2 - 4x + 6 = 0	3.00a	545	3.21b	615	3.72c	153	3.18	1313	
Understanding the meaning of a 1 in 175,223,510 probability of winning the Powerball lottery jackpot.	2.87a	545	3.09ь	615	3.39c	153	3.03	1313	

Spring 2018^{1,2,3,4}

 Note: Values in the same row and subtable not sharing the same subscript are significantly different at p<.05 in the two-sided test of equality for column means. Cells with no subscript are not included in the test. Tests assume equal variances.

2. Tests are adjusted for all pairwise comparisons within a row of each innermost subtable using the Bonferroni correction.

3. *STEM categories exclude 157 missing values (i.e., no course specified)

4. Response Scale: 1 = not confident; 2 = somewhat confident; 3 = confident; 4 = very confident

*Developmental (DevEd): BASIC MATHEMATICS (MAT0018); ELEMENTARY ALGEBRA (MAT0028); INTERMEDIATE ALGEBRA (MAT1033) Non-STEM: TPCS IN COLLEGE MATH (MGF1106); EXPLORATIONS IN MATH (MGF1107); COLLEGE ALGEBRA (MAC1105); ELEMT STATISTICS (STA2023); CALCULUS BUS/SOC SCI (MAC2233) STEM: COLLEGE TRIGONOMETRY (MAC1114); PRECALCULUS ALGEBRA (MAC1140); PRECALC ALGEBRA/TRIG (MAC1147); CALC ANALYTIC GEOM I (MAC2311); CALC ANALYTIC GEO II (MAC2312); CAL ANALYTIC GEO III (MAC2313); DIFREN EQUATIONS (MAP2302)



Q1: Indicate how confident you feel about correctly doing the following mathematics tasks.

DevEd □ Non-STEM STEM 5.00 *Developmental (DevEd): BASIC MATHEMATICS (MAT0018); ELEMENTARY ALGEBRA (MAT0028); INTERMEDIATE ALGEBRA (MAT1033) Non-STEM: TPCS IN COLLEGE MATH (MGF1106); EXPLORATIONS IN MATH (MGF1107); COLLEGE ALGEBRA (MAC1105); ELEMT STATISTICS (STA2023); CALCULUS BUS/SOC SCI (MAC2233) STEM: COLLEGE TRIGONOMETRY (MAC1114); PRECALCULUS ALGEBRA (MAC1140); PRECALC ALGEBRA/TRIG (MAC1147); CALC ANALYTIC GEOM I (MAC2311); CALC ANALYTIC GEO II (MAC2312); CAL ANALYTIC GEO III (MAC2313); DIFREN EQUATIONS (MAP2302) 4.00 3.00 2.00 1.00 0.00 Understanding

Calculating the Calculating how Understanding a Solving an Sketching a Calculating the Sketching the Calculating the Solving an price of a TV many square feet graph presented equation like 3x graph of a linear average of 4 graph of a amount of equation like x^2 the meaning of a after a 30% of tile you need online or in a + 5 = 17 function exam grades nonlinear money in an -4x + 6 = 0function such as account where discount to cover a floor newspaper $f(x) = (x-3)^2 + 1$ interest is

Response Scale: 1 = not confident; 2 = somewhat confident; 3 = confident; 4 = very confident. See separate table for statistically significant differences between categories. Source: 2018 FSCJ PMSES. Contact Institutional Analytics & Research (IAR)



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Florida State College at Jacksonville

1 in 175,223,510

probability of

winning the

Powerball lottery

jackpot.

Question 2 Overall Results

Thinking about studying mathematics, indicate the extent to which you agree with each of the following statements.

Table 7. Overall Results for PMSES Question 2

Q2: Thinking about studying mathematics, indicate the extent to which you agree with each of the following statements.	Mean	Valid N
If my calculation gives a result different from what I'd expect, I don't recheck my work.	1.81	1325
I try to predict what would be a reasonable answer before working a problem.	2.83	1325
Mathematics helps develop the mind and teaches a person to think.	3.29	1325
Studying math helps me with problem solving in other subjects.	2.96	1325
It is possible to explain mathematical ideas without using equations.	2.76	1325
When learning something new in math, I relate it to what I already know.	3.08	1325
I think it is unfair to expect me to solve a problem that is not similar to examples given in class or the textbook.	3.03	1325
There is usually only one correct approach to solving a math problem.	2.02	1325
Understanding math helps me make better decisions.	2.83	1325

Spring 2018^a

a. Scale: 1 = strongly disagree; 2 = disagree; 3 = agree; 4 = strongly agree



Q2: Indicate the extent to which you agree with each of the following statements.

All Respondents

Response Scale: 1 = strongly disagree; 2 = disagree; 3 = agree; 4 = strongly agree (n = 1,325). Source: 2018 FSCJ PMSES. Contact Institutional Analytics & Research (IAR)





4.00

Question 2 by Student Gender

Thinking about studying mathematics, indicate the extent to which you agree with each of the following statements.

Table 8. PMSES Question 2 Results by Student Gender

	Indicate your gender.				
- Q2: Thinking about studying mathematics, indicate the extent to which you agree with	ma	ile	fem	ale	
each of the following statements.	Mean	Valid N	Mean	Valid N	
If my calculation gives a result different from what I'd expect, I don't recheck my work.	1.84a	504	1.79a	796	
I try to predict what would be a reasonable answer before working a problem.	2.91 a	504	2.78ь	796	
Mathematics helps develop the mind and teaches a person to think.	3.28a	504	3.30a	796	
Studying math helps me with problem solving in other subjects.	3.00a	504	2.94a	796	
It is possible to explain mathematical ideas without using equations.	2.84a	504	2.71ь	796	
When learning something new in math, I relate it to what I already know.	3.06a	504	3.08a	796	
I think it is unfair to expect me to solve a problem that is not similar to examples given in class or the textbook.	2.89a	504	3.13ь	796	
There is usually only one correct approach to solving a math problem.	2.03a	504	2.01 a	796	
Understanding math helps me make better decisions.	2.91 a	504	2.78b	796	

Spring 2018^{1,2,3}

 Note: Values in the same row and subtable not sharing the same subscript are significantly different at p< .05 in the two-sided test of equality for column means. Cells with no subscript are not included in the test. Tests assume equal variances.

2. Tests are adjusted for all pairwise comparisons within a row of each innermost subtable using the Bonferroni correction.

3. Scale: 1 = strongly disagree; 2 = disagree; 3 = agree; 4 = strongly agree





Response Scale: 1 = strongly disagree; 2 = disagree; 3 = agree; 4 = strongly agree. A double dagger (\ddagger) symbol after the task description indicates statistical significance (p < .05). Source: 2018 FSCJ PMSES. Contact Institutional Analytics & Research (IAR)



Question 2 by Student Age

Thinking about studying mathematics, indicate the extent to which you agree with each of the following statements.

Table 9. PMSES Question 2 Results by Student Age Category

	Indicate your gender.				
Q2: Thinking about studying mathematics, indicate the extent to which you agree with	ma	ale	fem	ale	
each of the following statements.	Mean	Valid N	Mean	Valid N	
If my calculation gives a result different from what I'd expect, I don't recheck my work.	1.84a	504	1.79a	796	
I try to predict what would be a reasonable answer before working a problem.	2.91 a	504	2.78ь	796	
Mathematics helps develop the mind and teaches a person to think.	3.28a	504	3.30a	796	
Studying math helps me with problem solving in other subjects.	3.00a	504	2.94a	796	
It is possible to explain mathematical ideas without using equations.	2.84a	504	2.71ь	796	
When learning something new in math, I relate it to what I already know.	3.06a	504	3.08a	796	
I think it is unfair to expect me to solve a problem that is not similar to examples given in class or the textbook.	2.89a	504	3.13ь	796	
There is usually only one correct approach to solving a math problem.	2.03a	504	2.01 a	796	
Understanding math helps me make better decisions.	2.91 a	504	2.78ь	796	

Spring 2018^{1,2,3}

 Note: Values in the same row and subtable not sharing the same subscript are significantly different at p< .05 in the two-sided test of equality for column means. Cells with no subscript are not included in the test. Tests assume equal variances.

2. Tests are adjusted for all pairwise comparisons within a row of each innermost subtable using the Bonferroni correction.

3. Scale: 1 = strongly disagree; 2 = disagree; 3 = agree; 4 = strongly agree





Response Scale: 1 = strongly disagree; 2 = disagree; 3 = agree; 4 = strongly agree. See separate table for statistically significant differences between categories. Source: 2018 FSCJ PMSES. Contact Institutional Analytics & Research (IAR)



Question 2 by Student Race and Ethnicity

Thinking about studying mathematics, indicate the extent to which you agree with each of the following statements.

Table 10. PMSES Question 2 Results by Student Race and Ethnicity

02: Thinking about studying mathematics	Race/Ethnicity Group											
indicate the extent to which you agree with	Black		Wh	White		Hispanic		acial	Other			
each of the following statements.	Mean	Valid N	Mean	Valid N	Mean	Valid N	Mean	Valid N	Mean	Valid N		
If my calculation gives a result different from what I'd expect, I don't recheck my work.	1.82a	292	1.80a	692	1.73a	104	1.86a	98	1.82a	114		
l try to predict what would be a reasonable answer before working a problem.	2.71 a	292	2.90ь	692	2.84a,b	104	2.77a,b	98	2.76a,b	114		
Mathematics helps develop the mind and teaches a person to think.	3.28a	292	3.29a	692	3.40a	104	3.28a	98	3.24a	114		
Studying math helps me with problem solving in other subjects.	2.92a	292	2.98a	692	3.04a	104	2.86a	98	3.00a	114		
It is possible to explain mathematical ideas without using equations.	2.68a	292	2.81 a	692	2.67a	104	2.71 a	98	2.79a	114		
When learning something new in math, I relate it to what I already know.	3.05a	292	3.07a	692	3.17a	104	3.03a	98	3.07a	114		
I think it is unfair to expect me to solve a problem that is not similar to examples given in class or the textbook.	3.10a	292	3.01 a	692	3.07a	104	3.15a	98	2.87a	114		
There is usually only one correct approach to solving a math problem.	2.02a	292	2.03a	692	1.93a	104	2.00a	98	2.00a	114		
Understanding math helps me make better decisions.	2.81 a	292	2.83a	692	2.89a	104	2.69a	98	2.93a	114		

Spring 2018^{1,2,3}

1. Note: Values in the same row and subtable not sharing the same subscript are significantly different at p<.05 in the two-sided test of equality for column means. Cells with no subscript are not included in the test. Tests assume equal variances.

2. Tests are adjusted for all pairwise comparisons within a row of each innermost subtable using the Bonferroni correction.

3. Scale: 1 = strongly disagree; 2 = disagree; 3 = agree; 4 = strongly agree





Response Scale: 1 = strongly disagree; 2 = disagree; 3 = agree; 4 = strongly agree. See separate table for statistically significant differences between categories. Source: 2018 FSCJ PMSES. Contact Institutional Analytics & Research (IAR)



Question 2 by Student Degree or Award Sought

Thinking about studying mathematics, indicate the extent to which you agree with each of the following statements.

Table 11. PMSES Question 2 Results by Student Degree/Award

	Which of the following best describes the award that you are currently working to complete?											
Q2: Thinking about studying mathematics, indicate the extent to which you agree with each of the	Associate Degree	(e.g., AA, AS, AAS)	Bachelor's Degr BAS, B	ee (e.g., BS, SN)	Technical Cer Advanced Techni	rtificate or cal Certificate	Workforce	Certificate	Not App	licable		
following statements.	Mean	Valid N	Mean	Valid N	Mean	Valid N	Mean	Valid N	Mean	Valid N		
If my calculation gives a result different from what I'd expect, I don' t recheck my work.	1.81a	1042	1.80a	213	2.14a	7	2.67 a	3	1.60a	35		
l try to predict what would be a reasonable answer before working a problem.	2.82a	1042	2.90a	213	2.29a	7	3.33a	3	2.77a	35		
Mathematics helps develop the mind and teaches a person to think.	3.28a	1042	3.36a	213	3.00a	7	3.67a	3	3.29a	35		
Studying math helps me with problem solving in other subjects.	2.94a	1042	3.07 a	213	2.71a	7	3.67a	3	3.03a	35		
It is possible to explain mathematical ideas without using equations.	2.75a	1042	2.82a	213	2.29a	7	3.33a	3	2.86a	35		
When learning something new in math, I relate it to what I already know.	3.07a	1042	3.08a	213	2.71 a	7	3.67a	3	3.00a	35		
I think it is unfair to expect me to solve a problem that is not similar to examples given in class or the textbook.	3.04a	1042	3.06a	213	2.86a	7	3.33a	3	2.77a	35		
There is usually only one correct approach to solving a math problem.	2.01 a	1042	2.03a	213	2.29a	7	3.00a	3	1.89a	35		
Understanding math helps me make better decisions.	2.81 a	1042	2.91 a	213	2.86a	7	3.67a	3	3.00a	35		

Spring 2018^{1,2,3}

1. Note: Values in the same row and subtable not sharing the same subscript are significantly different at p<.05 in the two-sided test of equality for column means. Cells with no subscript are not included in the test. Tests assume equal variances.

2. Tests are adjusted for all pairwise comparisons within a row of each innermost subtable using the Bonferroni correction.

3. Scale: 1 = strongly disagree; 2 = disagree; 3 = agree; 4 = strongly agree



Q2: Indicate the extent to which you agree with each of the following statements.

Associate Degree (e.g., AA, AS, AAS)

Technical Certificate or Advanced Technical Certificate
Not Applicable

Bachelor's Degree (e.g., BS, BAS, BSN)

 $\hfill\square$ Workforce Certificate



Response Scale: 1 = strongly disagree; 2 = disagree; 3 = agree; 4 = strongly agree. See separate table for statistically significant differences between categories. Source: 2018 FSCJ PMSES. Contact Institutional Analytics & Research (IAR)



Question 2 by Math STEM Course Classification Category

Thinking about studying mathematics, indicate the extent to which you agree with each of the following statements.

Table 12. PMSES Question 2 Results by STEM Course Classification Category

02: Thinking about studying mathematics				STEM Ca	tegory*			
indicate the extent to which you agree with	Dev	Ed	Non-S	STEM	STE	EM	To	tal
each of the following statements.	Mean	Valid N	Mean	Valid N	Mean	Valid N	Mean	Valid N
If my calculation gives a result different from what I'd expect, I don't recheck my work.	1.92a	545	1.76ь	615	1.61ь	153	1.81	1313
l try to predict what would be a reasonable answer before working a problem.	2.75a	545	2.84a	615	3.07ь	153	2.83	1313
Mathematics helps develop the mind and teaches a person to think.	3.19a	545	3.30b	615	3.59c	153	3.29	1313
Studying math helps me with problem solving in other subjects.	2.84a	545	2.98b	615	3.35c	153	2.96	1313
It is possible to explain mathematical ideas without using equations.	2.70a	545	2.79a	615	2.88a	153	2.76	1313
When learning something new in math, I relate it to what I already know.	3.01 a	545	3.07a	615	3.29b	153	3.07	1313
l think it is unfair to expect me to solve a problem that is not similar to examples given in class or the textbook.	3.04a	545	3.07a	615	2.84ь	153	3.03	1313
There is usually only one correct approach to solving a math problem.	2.09a	545	2.03a	615	1.73b	153	2.02	1313
Understanding math helps me make better decisions.	2.70a	545	2.86ь	615	3.19¢	153	2.83	1313

Spring 2018^{1,2,3,4}

1. Note: Values in the same row and subtable not sharing the same subscript are significantly different at p<.05 in the two-sided test of equality for column means. Cells with no subscript are not included in the test. Tests assume equal variances.

2. Tests are adjusted for all pairwise comparisons within a row of each innermost subtable using the Bonferroni correction.

3. *STEM categories exclude 157 missing values (i.e., no course specified)

4. Scale: 1 = strongly disagree; 2 = disagree; 3 = agree; 4 = strongly agree



Q2: Indicate the extent to which you agree with each of the following statements.

🖪 DevEd

■ Non-STEM

🛛 STEM

*Developmental (DevEd): BASIC MATHEMATICS (MAT0018); ELEMENTARY ALGEBRA (MAT0028); INTERMEDIATE ALGEBRA (MAT1033)

4.00 Non-STEM: TPCS IN COLLEGE MATH (MGF1106); EXPLORATIONS IN MATH (MGF1107); COLLEGE ALGEBRA (MAC1105); ELEMT STATISTICS (STA2023); CALCULUS BUS/SOC SCI (MAC2233) STEM: COLLEGE TRIGONOMETRY (MAC1114); PRECALCULUS ALGEBRA (MAC1140); PRECALC ALGEBRA/TRIG (MAC1147); CALC ANALYTIC GEOM I (MAC2311); CALC ANALYTIC GEO II (MAC2312); CAL ANALYTIC GEO III (MAC2313); DIFREN EQUATIONS (MAP2302)



Response Scale: 1 = strongly disagree; 2 = disagree; 3 = agree; 4 = strongly agree. See separate table for statistically significant differences between categories. Source: 2018 FSCJ PMSES. Contact Institutional Analytics & Research (IAR)



CHAID Analysis

- Chi-squared Automatic Interaction Detection (CHAID) is part of a group of statistical procedures generally referred to as classification or tree analysis. This set of algorithms produces models that classify cases into groups or predict values of a dependent (target) variable based on values of one or more predictor (independent) variable(s). The procedures provide validation for exploratory and confirmatory analysis.
 - At each step, CHAID chooses the independent (predictor) variable that has the strongest interaction with the dependent variable. Categories of each predictor are merged if they are not significantly different with respect to the dependent variable (see Kass, 1980)¹.
- CHAID is useful to quickly and efficiently identify statistically significant predictors in relation to a target variable.
 - For example, one may ask if there is a significant difference between a mean test or survey score (as a dependent variable) based on any number of independent variables (predictors) such as age, race, gender, disadvantaged status, course, academic level, etc. of an individual respondent (case). While a series of single procedures (e.g., independent group t-tests or Chi-square contingency table analysis) could be used for each predictor, CHAID processes all predictors simultaneously and identifies significant relationships all at once producing a model with a tree diagram showing the differences visually as a tree diagram along with other output statistics describing the accuracy of the model.
- The following CHAID models were produced for PMSES questions 1 and 2 using predictors of respondent age, race/ethnicity, gender degree/award sought, and STEM course classification. For brevity, only the tree diagrams are shown. The summary tables (slide 47) summarize all CHAID results.

⁽¹⁾ Kass, G. 1980. An exploratory technique for investigating large quantities of categorical data. *Applied Statistics*, 29:2, 119-127.



CHAID Q1.1: Calculating the price of a TV after a 30% discount





CHAID Q1.2: Calculating how many square feet of tile you need to cover a floor

Calculating how many square feet





CHAID Q1.3: Understanding a graph presented online or in a newspaper

Source: 2018 FSCJ PMSES. Item: *Indicate how confident you feel about correctly doing the following mathematics tasks*. Response Scale: 1 = not confident; 2 = somewhat confident; 3 = confident; 4 = very confident .

Understanding a graph presented online or in a newspaper Node O Mean 3.391 Std. Dev. 0.820 n 1470 % 100.0 Predicted 3.391 RACE/ETHNICITY Adj. P-value=0.000, F=66.381, df1=1, df2=1468 Other; Black; Hispanic; <missing> White; Multiracial Node 1 Node 2 Mean 3.207 Mean 3.549 Std. Dev. 0.900 Std. Dev. 0.708 790 n 680 n 96 46.3 26 53.7 Predicted 3.207 Predicted 3.549 --STEM Category STEM Category Adj. P-value=0.001, F=9.249, Adj. P-value=0.001, F=7.262, df1=2, df2=677 df1=2, df2=787 Non-STEM; <blank> STEM DevEd Non-STEM STEM DevEd Node 3 Node 4 Node 5 Node 6 Node 7 Node 8 Mean 3.249 Mean 3.596 Mean 3.044 Mean 3.574 Mean 3.752 Mean 3.456 Std. Dev. 0.885 Std. Dev. 0.721 Std. Dev. 0.930 Std. Dev. 0.687 Std. Dev. 0.498 Std. Dev. 0.772 n 401 n 52 n. 227 n. 371 n 101 n. 318 % 27.3 % 3.5 % 15.4 % 25.2 % 6.9 % 21.6 Predicted 3.249 Predicted 3.596 Predicted 3.044 Predicted 3.574 Predicted 3.752 Predicted 3.456 -GENDER Adj. P-value=0.004, F=10.404, df1=1, df2=399 male female; <missing> Node 9 Node 10 Mean 3.548 Mean 3.183 Std. Dev. 0.708 Std. Dev. 0.907 73 D. n 328 % 5.0 % 22.3



Predicted

3.548

Predicted

3.183

CHAID Q1.4: Solving an equation like 3x + 5 = 17





CHAID Q1.5: Sketching a graph of a linear function





CHAID Q1.6: Calculating the average of 4 exam grades





CHAID Q1.7: Sketching the graph of a nonlinear function such as $f(x) = (x-3)^2 + 1$





CHAID Q1.8: Calculating the amount in an account with continuous compounding

Source: 2018 FSCJ PMSES. Item: *Indicate how confident you feel about correctly doing the following mathematics tasks*. Response Scale: 1 = not confident; 2 = somewhat confident; 3 = confident; 4 = very confident .

Calculating the amount of money in an account where interest is compounded continuously Node O Mean 2.782 Std. Dev. 1.055 n 1470 % 100.0 Predicted 2.782 -GENDER Adj. P-value=0.000, F=22.873, df1=1, df2=1468 male; <missing> female Node 1 Node 2 Mean 2.924 Mean 2.662 Std. Dev. 1.031 Std. Dev. 1.062 674 796 n n % 45.9 % 54.1 Predicted 2.924 Predicted 2.662 -DEGREE/AWARD STEM Category Adj. P-value=0.019, F=7.473, Adj. P-value=0.011, F=12.944, df1=1, df2=672 df1=1, df2=794 Bachelor's Degree (e.g., BS, BAS, Non-STEM; DevEd STÈM Associate Degree (e.g., AA, AS, AAS); Technical Certificate or BSN); Not Applicable; Workforce Advanced Technical Certificate; Certificate <missing> Node 3 Node 4 Node 5 Node 6 Mean 2.861 Mean 3.243 Mean 2.631 Mean 3.000 Std. Dev. 1.039 Std. Dev. 0.927 Std. Dev. 1.055 Std. Dev. 1.087 n 563 n 111 n 729 n 67 % 38.3 % 7.6 % 49.6 % 4.6 Predicted 2.861 Predicted 3.243 Predicted 2.631 Predicted 3.000 1-AGE CATEGORY Adj. P-value=0.024, F=11.366, df1=1, df2=727 under 18; 18 to 24 25 to 34; 35 to 44; 45 to 54; over 55 Node 7 Node 8 Mean 2.537 Mean 2.812 Std. Dev. 1.045 Std. Dev. 1.048 479 250 n n

%

Predicted

32.6

2.537

%

Predicted

17.0

2.812



CHAID Q1.9: Solving an equation like $x^2 - 4x + 6 = 0$





CHAID Q1.10: Understanding a 1 in 175,223,510 probability of winning the Powerball.





CHAID Q2.1: If my calculation gives a result different from what I'd expect, I don't recheck my work.

If my calculation gives a result different from what I'd expect, I don't recheck my work.





CHAID Q2.2: I try to predict what would be a reasonable answer before working a problem. I try to predict what would be a

reasonable answer before working a problem.



n

%

CHAID Q2.3: Mathematics helps develop the mind and teaches a person to think.





CHAID Q2.4: Studying math helps me with problem solving in other subjects.

Studying math helps me with problem solving in other subjects.





CHAID Q2.5: It is possible to explain mathematical ideas without using equations.

It is possible to explain mathematical ideas without using equations. Node O Mean 2.763 Std. Dev. 0.842 1325 n % 100.0 2.763 Predicted _





CHAID Q2.6: When learning something new in math, I relate it to what I already know.

When learning something new in math, I relate it to what I already know.





CHAID Q2.7: I think it is unfair to expect me to solve a problem that is not similar to examples given in class or the textbook.

I think it is unfair to expect me to solve a problem that is not similar to examples given in class or the textbook.





CHAID Q2.8: There is usually only one correct approach to solving a math problem.

There is usually only one correct approach to solving a math problem.





CHAID Q2.9 : Understanding math helps me make better decisions.

Understanding math helps me make better decisions. Node O Mean 2.833 Std. Dev. 0.887 1325 n % 100.0 Predicted 2.833 — STEM Category Adj. P-value=0.000, F=19.761, df1=2, df2=1322 Non-STEM STEM; <blank> DevEd Node 1 Node 2 Node 3 Mean 2.859 Mean 3.182 Mean 2.699 Std. Dev. 0.864 Std. Dev. 0.791 Std. Dev. 0.910 n 615 n 165 545 n. % 46.4 % 12.5 % 41.1 Predicted 2.859 Predicted 3.182 Predicted 2.699 I– AGE CATEGORY Adj. P-value=0.039, F=11.860, df1=1, df2=613 under 18; 18 to 24; 35 to 44 25 to 34; 45 to 54; over 55; <missing> Node 4 Node 5 Mean 2.786 Mean 3.054 Std. Dev. 0.881 Std. Dev. 0.788 449 166 n n % 33.9 % 12.5 Predicted 2.786 Predicted 3.054 Ŀ GENDER Adj. P-value=0.010, F=8.861, df1=1, df2=164 male; <missing> female Node 6 Node 7 Mean 3.304 Mean 2.927 Std. Dev. 0.711 Std. Dev. 0.798 n 56 n 110 % 4.2 % 8.3 Predicted 3.304 Predicted 2.927



PMSES CHAID Summary Tables

Table 1. Q1 CHAID Predictor Output Order, Significant Independent Variables in Order of Model Importance

ID	Indicate how confident you feel about correctly doing the following mathematics tasks.*	Significant Predictors Order of Model Importance						
		GENDER	RACE- ETHNICITY	AGE CATEGORY	STEM CATEGORY	DEGREE- AWARD		
1.1	Calculating the price of a TV after a 30% discount	4	2	3	1			
1.2	Calculating how many square feet of tile you need to cover a floor	2	1	3	4			
1.3	Understanding a graph presented online or in a newspaper	3	1		2			
1.4	Solving an equation like 3x + 5 = 17	2		1				
1.5	Sketching a graph of a linear function	2			1			
1.6	Calculating the average of 4 exam grades		2		1			
1.7	Sketching the graph of a nonlinear function such as $f(x) = (x-3)^2 + 1$			2	1			
1.8	Calculating the amount of money in an account where interest is compounded continuously	1		4	3	2		
1.9	Solving an equation like x^2 - 4x + 6 = 0			2	1			
1.10	Understanding the meaning of a 1 in 175,223,510 probability of winning the Powerball lottery jackpot.	1	2		3			
	You have a set of the set							

*Scale: 1 = not confident; 2 = somewhat confident; 3 = confident; 4 = very confident

Table 2. Q2 CHAID Predictor Output Order, Significant Independent Variables in Order of Model Importance

ID	- Thinking about studying mathematics, indicate the extent to which you agree with each of the following statements.*	Significant Predictors Order of Model Importance						
		GENDER	RACE-	AGE	STEM	DEGREE-		
			ETHNICITY	CATEGORY	CATEGORY	AWARD		
2.1	If my calculation gives a result different from what I'd expect, I don't recheck my work.			1	2			
2.2	I try to predict what would be a reasonable answer before working a problem.	3	2		1			
2.3	Mathematics helps develop the mind and teaches a person to think.			2	1			
2.4	Studying math helps me with problem solving in other subjects.			2	1			
2.5	It is possible to explain mathematical ideas without using equations.	1	2					
2.6	When learning something new in math, I relate it to what I already know.				1			
2.7	I think it is unfair to expect me to solve a problem that is not similar to examples given in class or the textbook.	1		2				
2.8	There is usually only one correct approach to solving a math problem.			2	1			
2.9	Understanding math helps me make better decisions.	3		2	1			

*Scale: 1 = strongly disagree; 2 = disagree; 3 = agree; 4 = strongly agree



Summary

The PMSES provides decision makers with information to gain a better sense of student perceptions of mathematics self-efficacy from the perspective of the learner.

As a faculty led effort in collaboration with the FSCJ Offices of <u>Institutional Effectiveness and Accreditation</u> and <u>Strategic Planning</u>, the PMSES provides useful information valuable to the promotion of student success in mathematics courses at the College. Such information can be used to better inform planned or proposed teaching/learning improvements at the course level.

Regular, periodic redeployment of the PMSES (e.g., fall and spring terms) will provide an opportunity to collect additional comparative (longitudinal) information regarding the degree of consistency of perceived student mathematics self-efficacy over time. Such measures can provide evidence of progress in teaching/learning as well as support important strategic efforts at the College related to Achieving the Dream (ATD) and ongoing regional accreditation reporting and reaffirmation.

For further information, please contact Dr. Greg Michalski, Director of Institutional Analytics and Research (IAR).

