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.

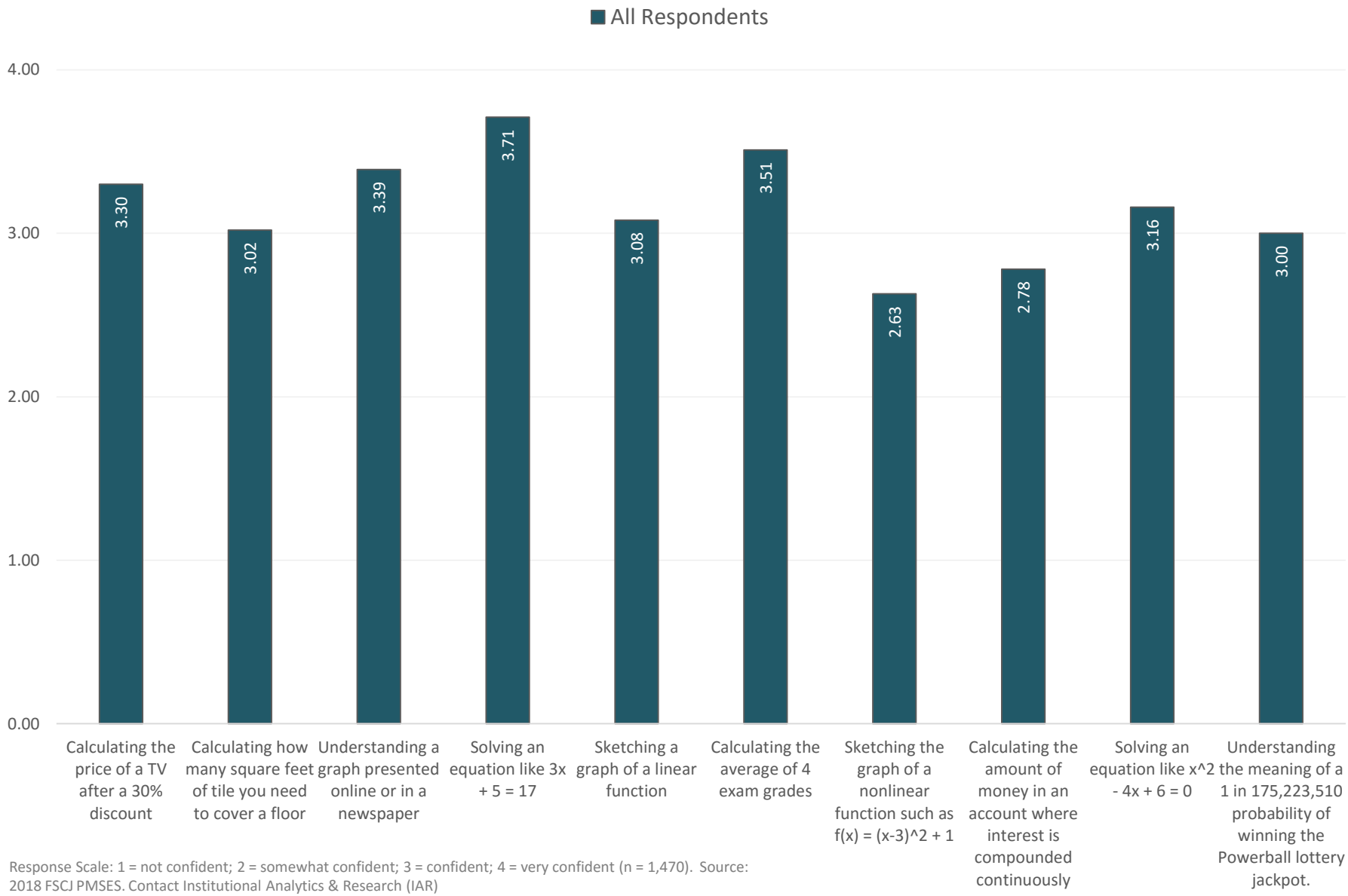
Table 1. Overall Results for PMSES Question 1

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.



Response Scale: 1 = not confident; 2 = somewhat confident; 3 = confident; 4 = very confident (n = 1,470). Source: 2018 FSCJ PMSES. Contact Institutional Analytics & Research (IAR)

Question 1 by Student Gender

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

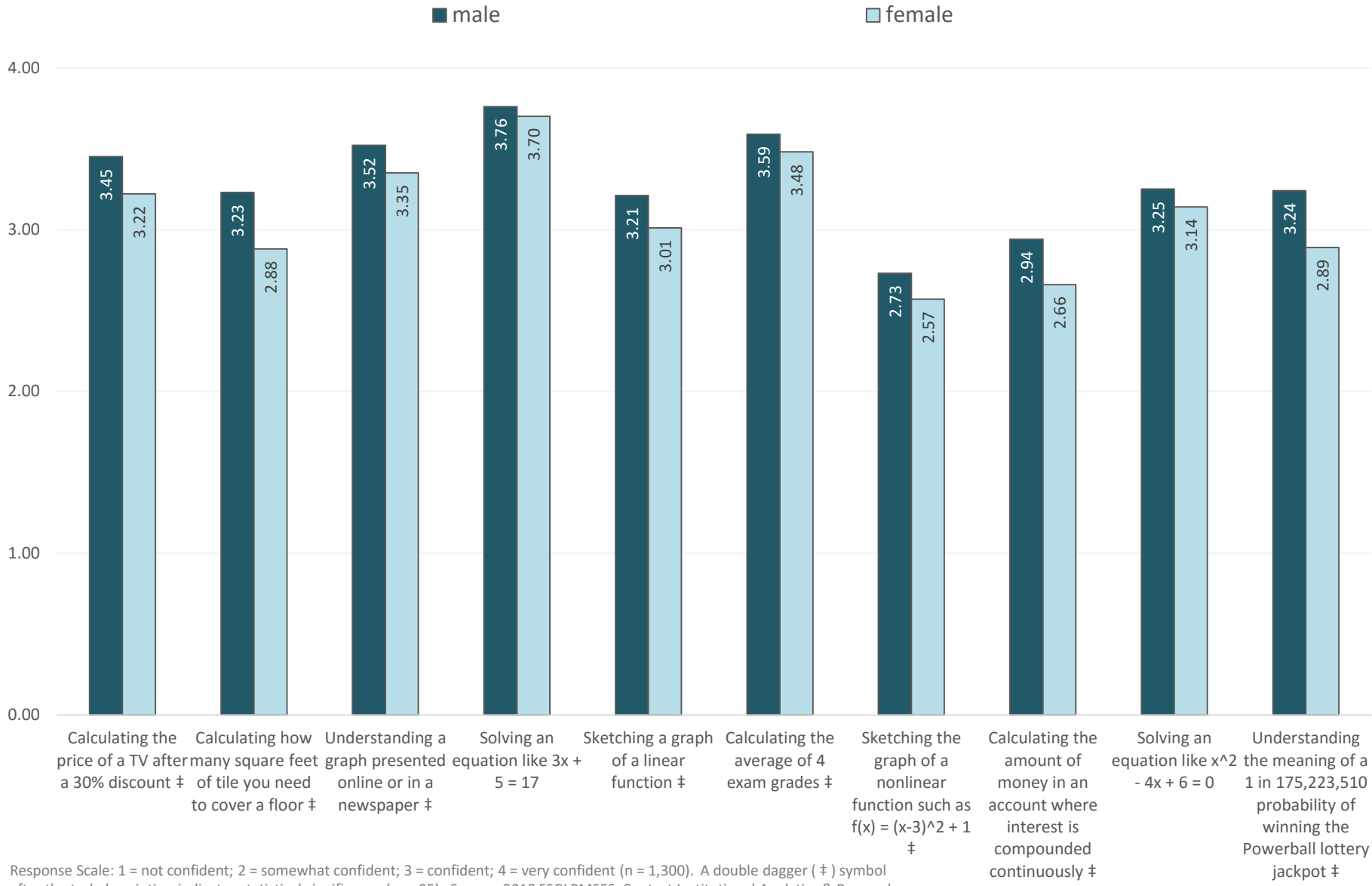
Table 2. PMSES Question 1 Results by Student Gender

Q1: Indicate how confident you feel about correctly doing the following mathematics tasks.	Indicate your gender.			
	male		female	
	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	3.35b	796
Solving an equation like 3x + 5 = 17	3.76a	504	3.70a	796
Sketching a graph of a linear function	3.21a	504	3.01b	796
Calculating the average of 4 exam grades	3.59a	504	3.48b	796
Sketching the graph of a nonlinear function such as f(x) = (x-3)^2 + 1	2.73a	504	2.57b	796
Calculating the amount of money in an account where interest is compounded continuously	2.94a	504	2.66b	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.



Response Scale: 1 = not confident; 2 = somewhat confident; 3 = confident; 4 = very confident (n = 1,300). A double dagger (‡) symbol after the task description indicates statistical significance ($p < .05$). Source: 2018 FSCJ PMSES. Contact Institutional Analytics & Research

Question 1 by Student Age

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

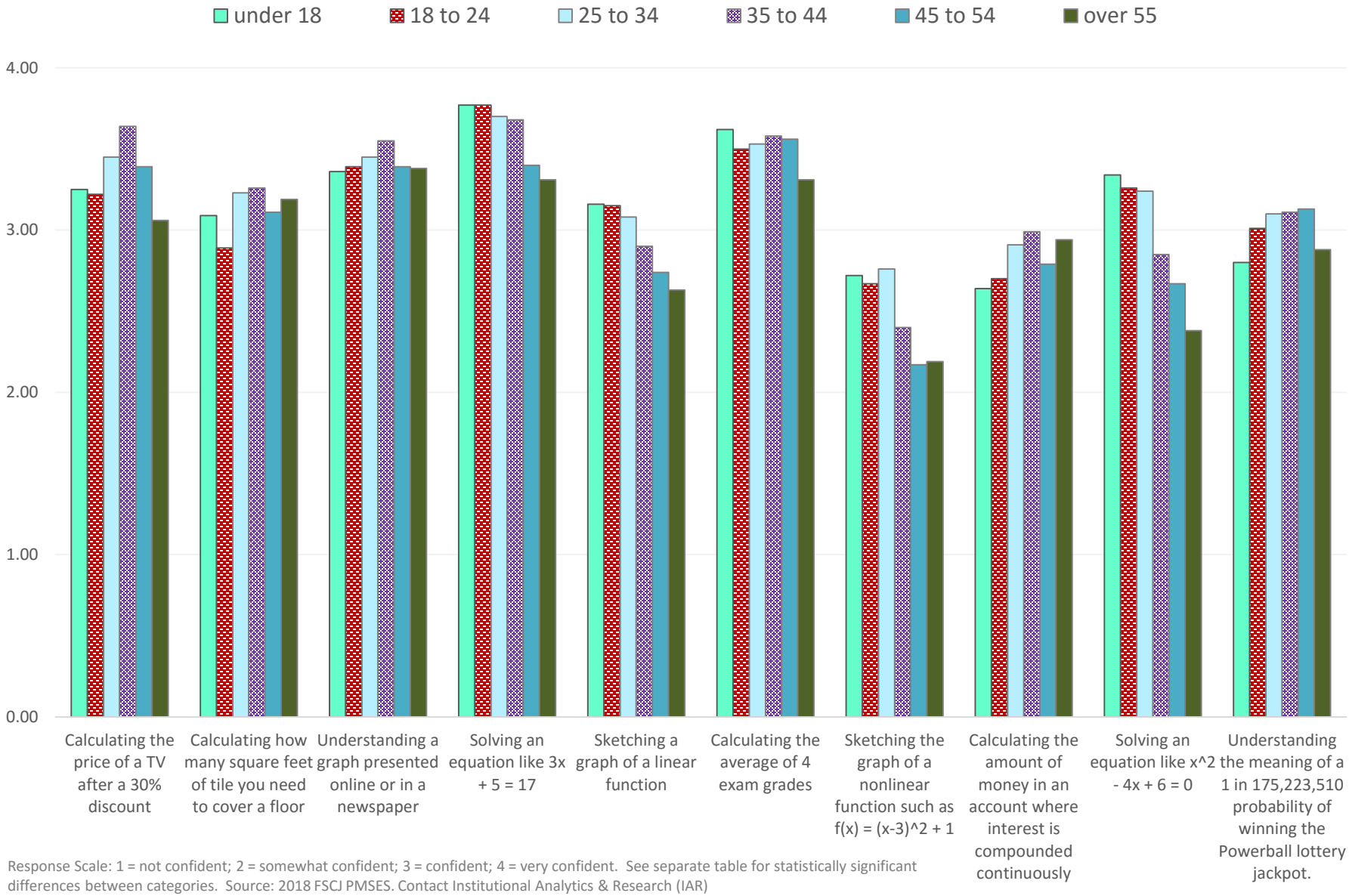
Table 3. PMSES Question 1 Results by Student Age Category

Q1: Indicate how confident you feel about correctly doing the following mathematics tasks.	Indicate your age category.											
	under 18		18 to 24		25 to 34		35 to 44		45 to 54		over 55	
	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	3.40b	70	3.31a,b	16
Sketching a graph of a linear function	3.16a,b	87	3.15a	762	3.08a,b	241	2.90a,b	124	2.74b	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	3.31a	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	2.17b	70	2.19a,b	16
Calculating the amount of money in an account where interest is compounded continuously	2.64a	87	2.70a	762	2.91a	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	2.67b	70	2.38b	16
Understanding the meaning of a 1 in 175,223,510 probability of winning the Powerball lottery jackpot.	2.80a	87	3.01a	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

Q1: 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. See separate table for statistically significant differences between categories. Source: 2018 FSCJ PMSES. Contact Institutional Analytics & Research (IAR)

Question 1 by Student Race and Ethnicity

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

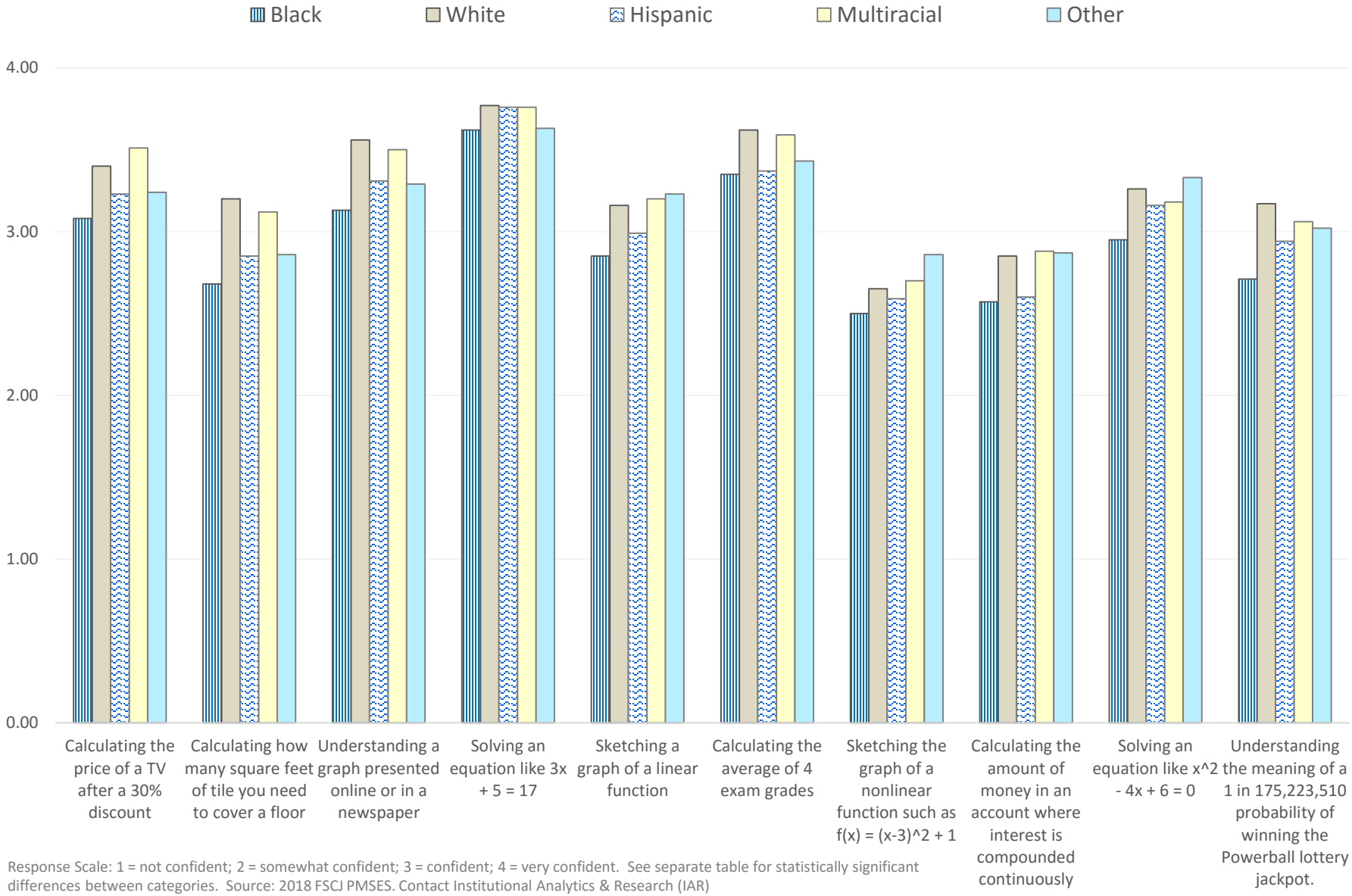
Table 4. PMSES Question 1 Results by Student Race and Ethnicity

Q1: Indicate how confident you feel about correctly doing the following mathematics tasks.	Race/Ethnicity Group									
	Black		White		Hispanic		Multiracial		Other	
	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	3.40b	692	3.23a,b	104	3.51b	98	3.24a,b	114
Calculating how many square feet of tile you need to cover a floor	2.68a	292	3.20b	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	3.56b	692	3.31a,c	104	3.50b,c,d	98	3.29a,d	114
Solving an equation like 3x + 5 = 17	3.62a	292	3.77b	692	3.76a,b	104	3.76a,b	98	3.63a,b	114
Sketching a graph of a linear function	2.85a	292	3.16b	692	2.99a,b	104	3.20b	98	3.23b	114
Calculating the average of 4 exam grades	3.35a	292	3.62b	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	2.85b	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	3.26b	692	3.16a,b	104	3.18a,b	98	3.33b	114
Understanding the meaning of a 1 in 175,223,510 probability of winning the Powerball lottery jackpot.	2.71a	292	3.17b	692	2.94a,b	104	3.06b	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

Q1: 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. See separate table for statistically significant 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.

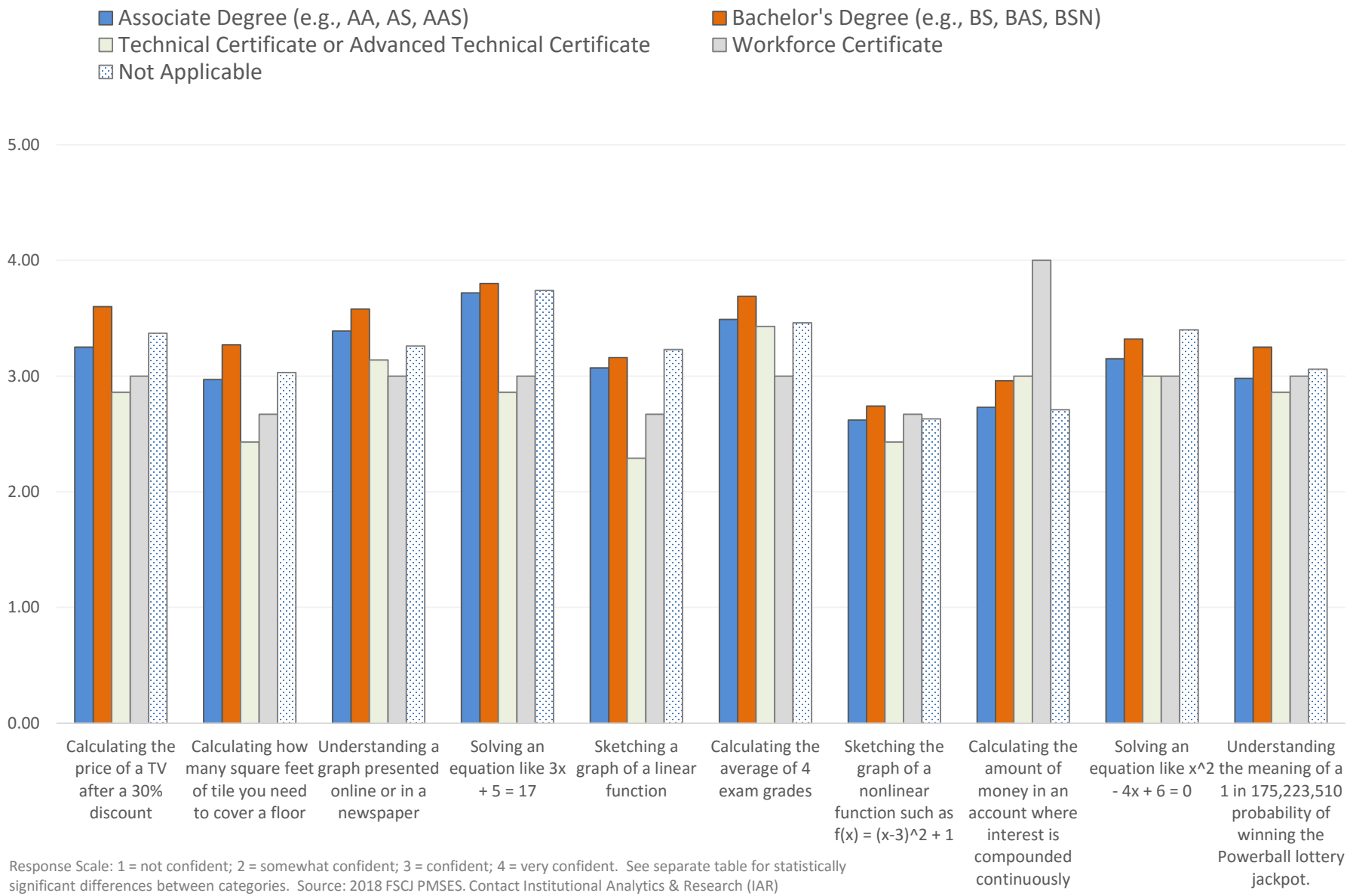
Table 5. PMSES Question 1 Results by Student Degree/Award

Q1: Indicate how confident you feel about correctly doing the following mathematics tasks.	Which of the following best describes the award that you are currently working to complete?									
	Associate Degree (e.g., AA, AS, AAS)		Bachelor's Degree (e.g., BS, BAS, BSN)		Technical Certificate or Advanced Technical Certificate		Workforce Certificate		Not Applicable	
	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	2.86b	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	3.69b	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	3.25b	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.



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)

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

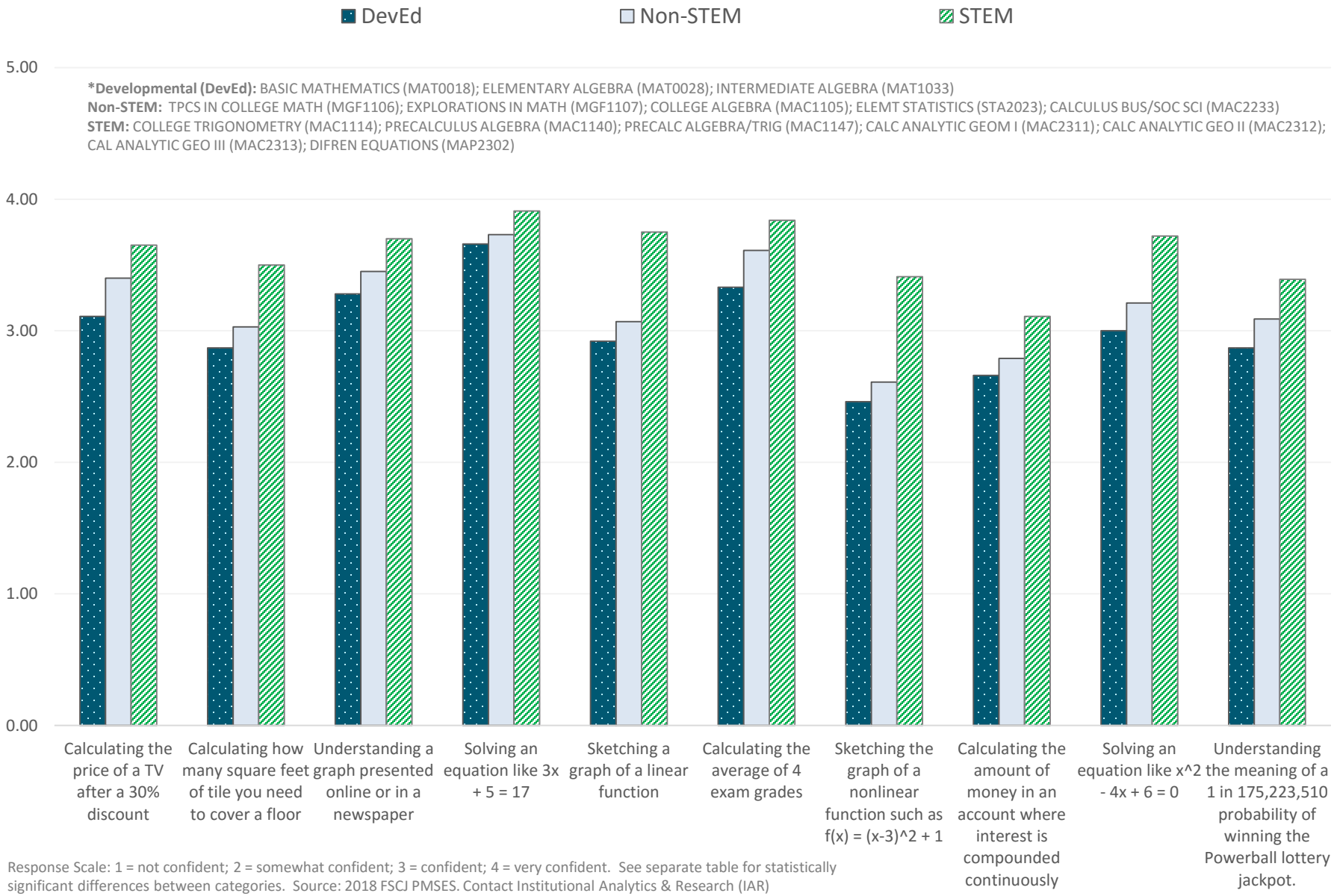
Q1: Indicate how confident you feel about correctly doing the following mathematics tasks.	STEM Category*							
	DevEd		Non-STEM		STEM		Total	
	Mean	Valid N	Mean	Valid N	Mean	Valid N	Mean	Valid N
Calculating the price of a TV after a 30% discount	3.11a	545	3.40b	615	3.65c	153	3.31	1313
Calculating how many square feet of tile you need to cover a floor	2.87a	545	3.03b	615	3.50c	153	3.02	1313
Understanding a graph presented online or in a newspaper	3.28a	545	3.45b	615	3.70c	153	3.41	1313
Solving an equation like 3x + 5 = 17	3.66a	545	3.73a	615	3.91b	153	3.72	1313
Sketching a graph of a linear function	2.92a	545	3.07b	615	3.75c	153	3.09	1313
Calculating the average of 4 exam grades	3.33a	545	3.61b	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	2.61a	615	3.41b	153	2.64	1313
Calculating the amount of money in an account where interest is compounded continuously	2.66a	545	2.79a	615	3.11b	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	3.09b	615	3.39c	153	3.03	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. 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.



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)

Question 2 Overall Results

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

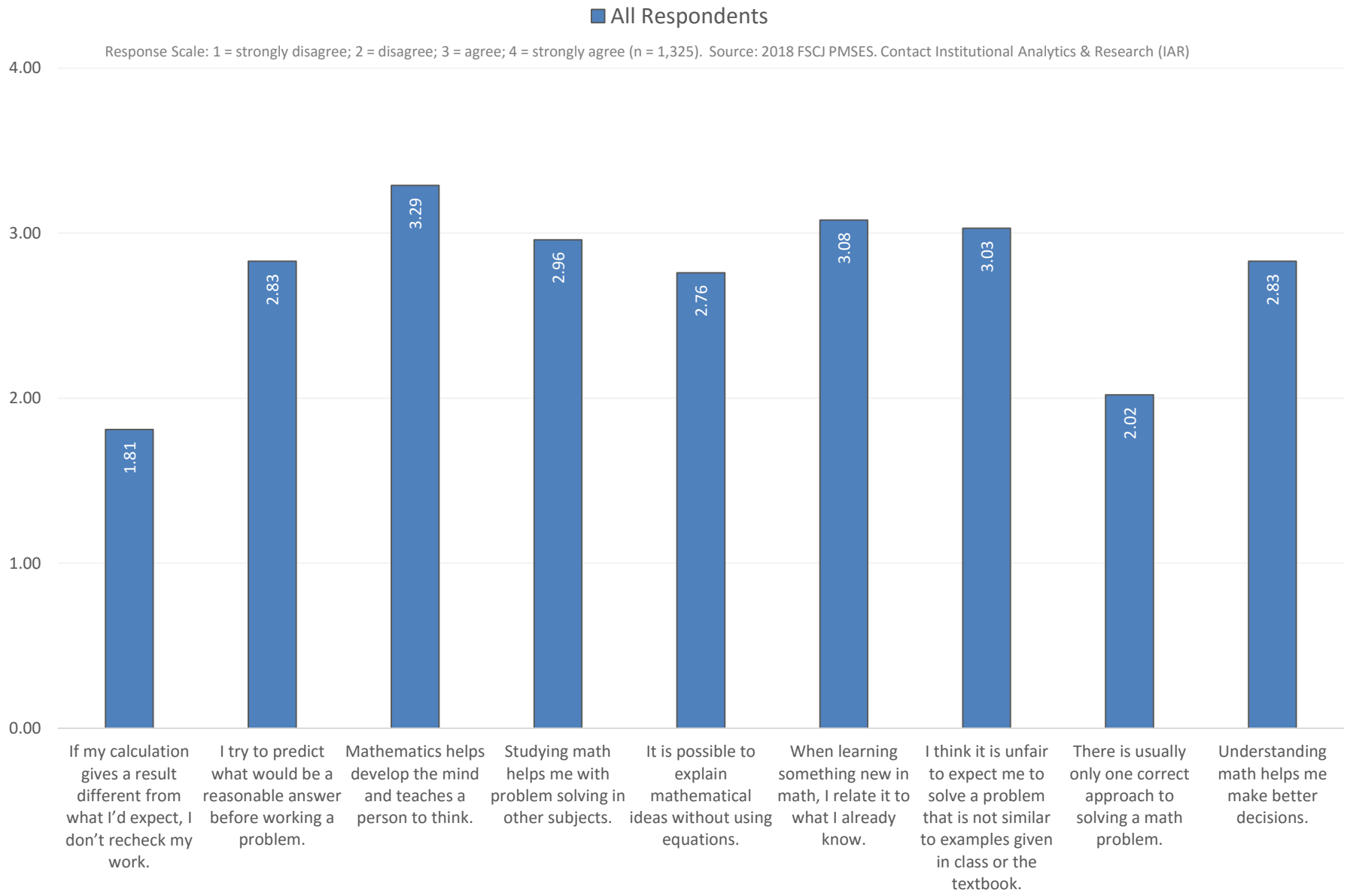
Table 7. Overall Results for PMSES Question 2

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.



Question 2 by Student Gender

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

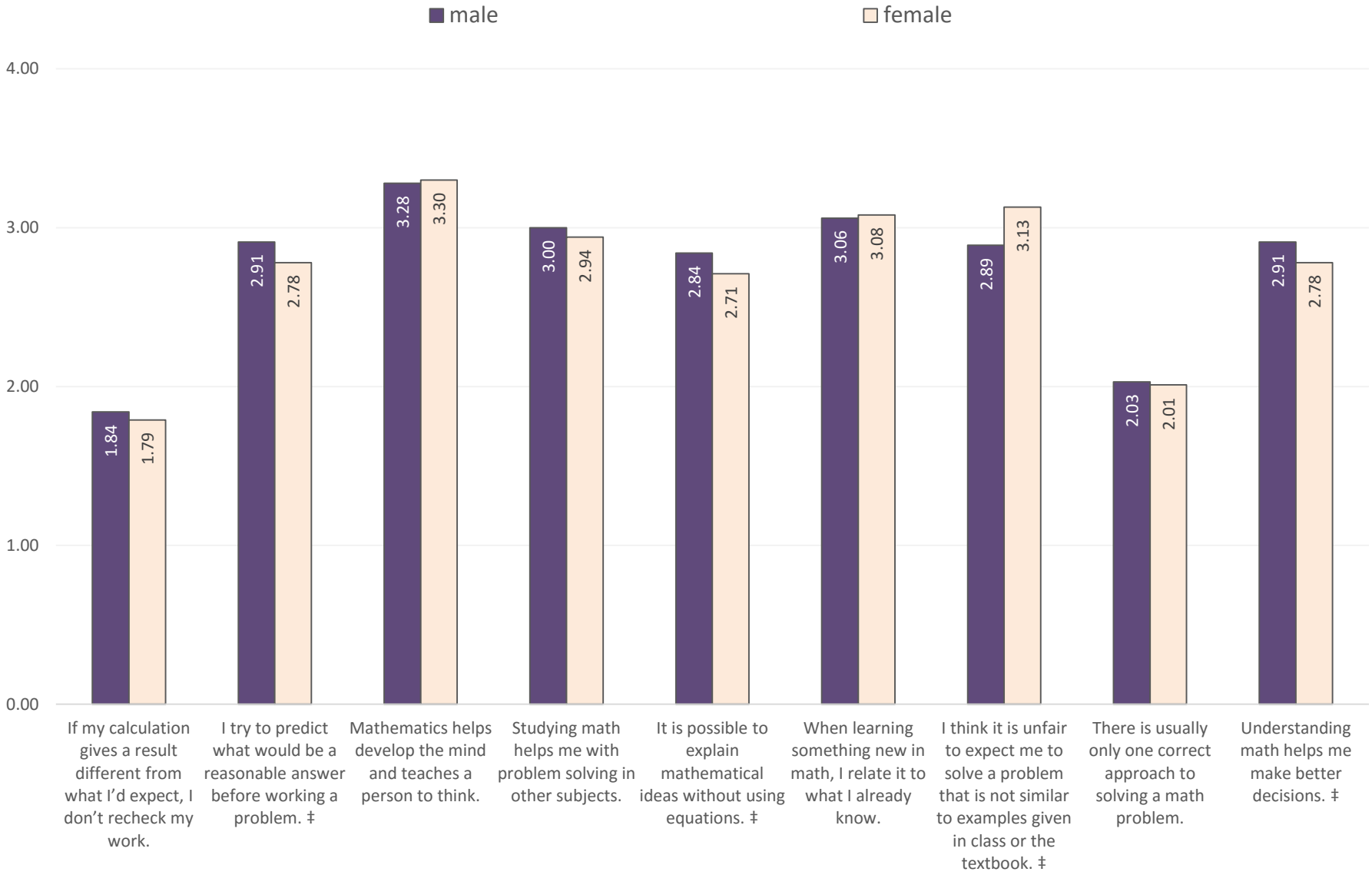
Table 8. PMSES Question 2 Results by Student Gender

Q2: Thinking about studying mathematics, indicate the extent to which you agree with each of the following statements.	Indicate your gender.			
	male		female	
	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.	2.91a	504	2.78b	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	2.71b	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	3.13b	796
There is usually only one correct approach to solving a math problem.	2.03a	504	2.01a	796
Understanding math helps me make better decisions.	2.91a	504	2.78b	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. 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.



Response Scale: 1 = strongly disagree; 2 = disagree; 3 = agree; 4 = strongly agree. A double dagger (‡) 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.

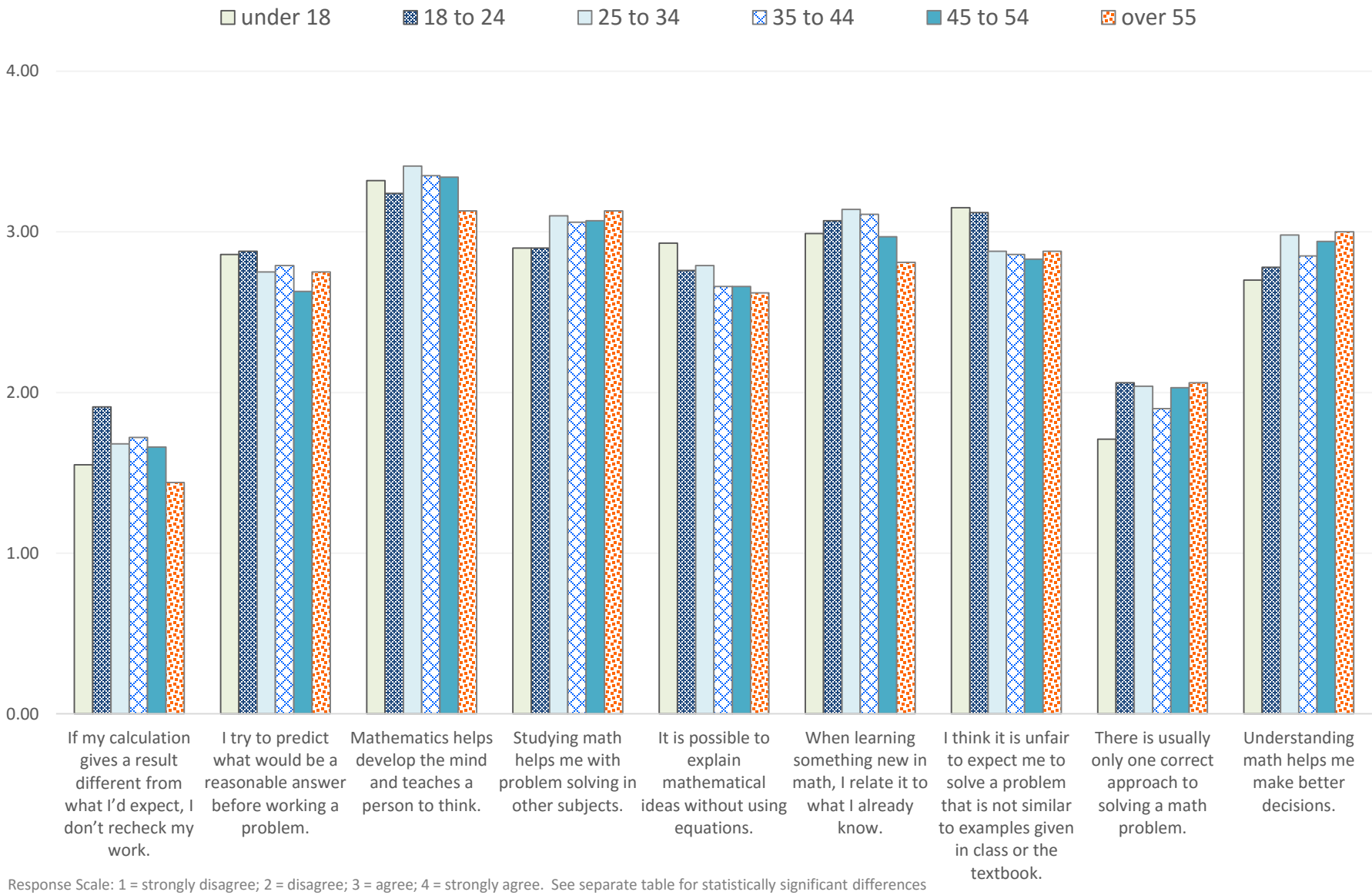
Table 9. PMSES Question 2 Results by Student Age Category

Q2: Thinking about studying mathematics, indicate the extent to which you agree with each of the following statements.	Indicate your gender.			
	male		female	
	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.	2.91a	504	2.78b	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	2.71b	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	3.13b	796
There is usually only one correct approach to solving a math problem.	2.03a	504	2.01a	796
Understanding math helps me make better decisions.	2.91a	504	2.78b	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. 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.



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.

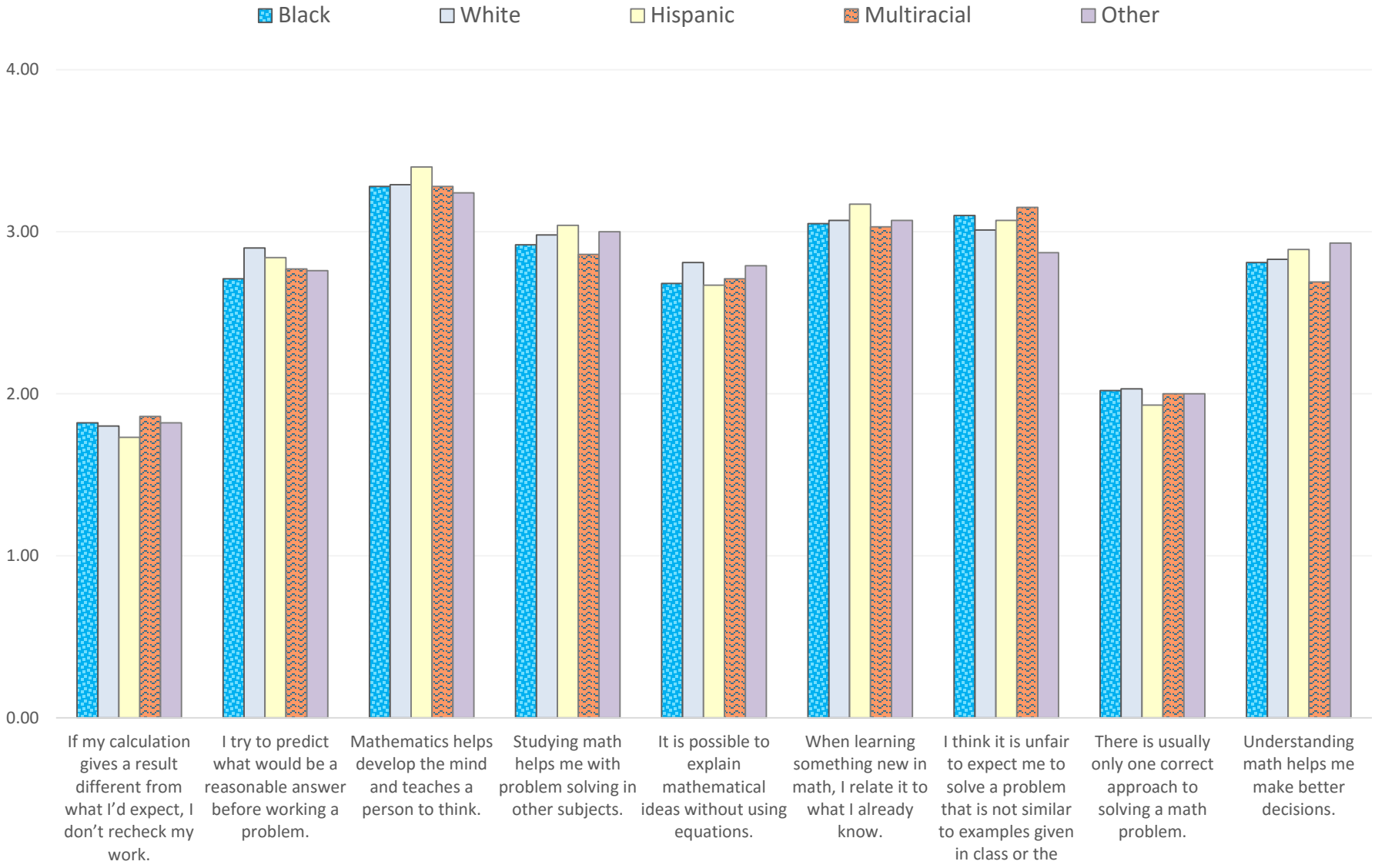
Table 10. PMSES Question 2 Results by Student Race and Ethnicity

Q2: Thinking about studying mathematics, indicate the extent to which you agree with each of the following statements.	Race/Ethnicity Group									
	Black		White		Hispanic		Multiracial		Other	
	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
I try to predict what would be a reasonable answer before working a problem.	2.71a	292	2.90b	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	2.81a	692	2.67a	104	2.71a	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	3.01a	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.	2.81a	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

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



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.

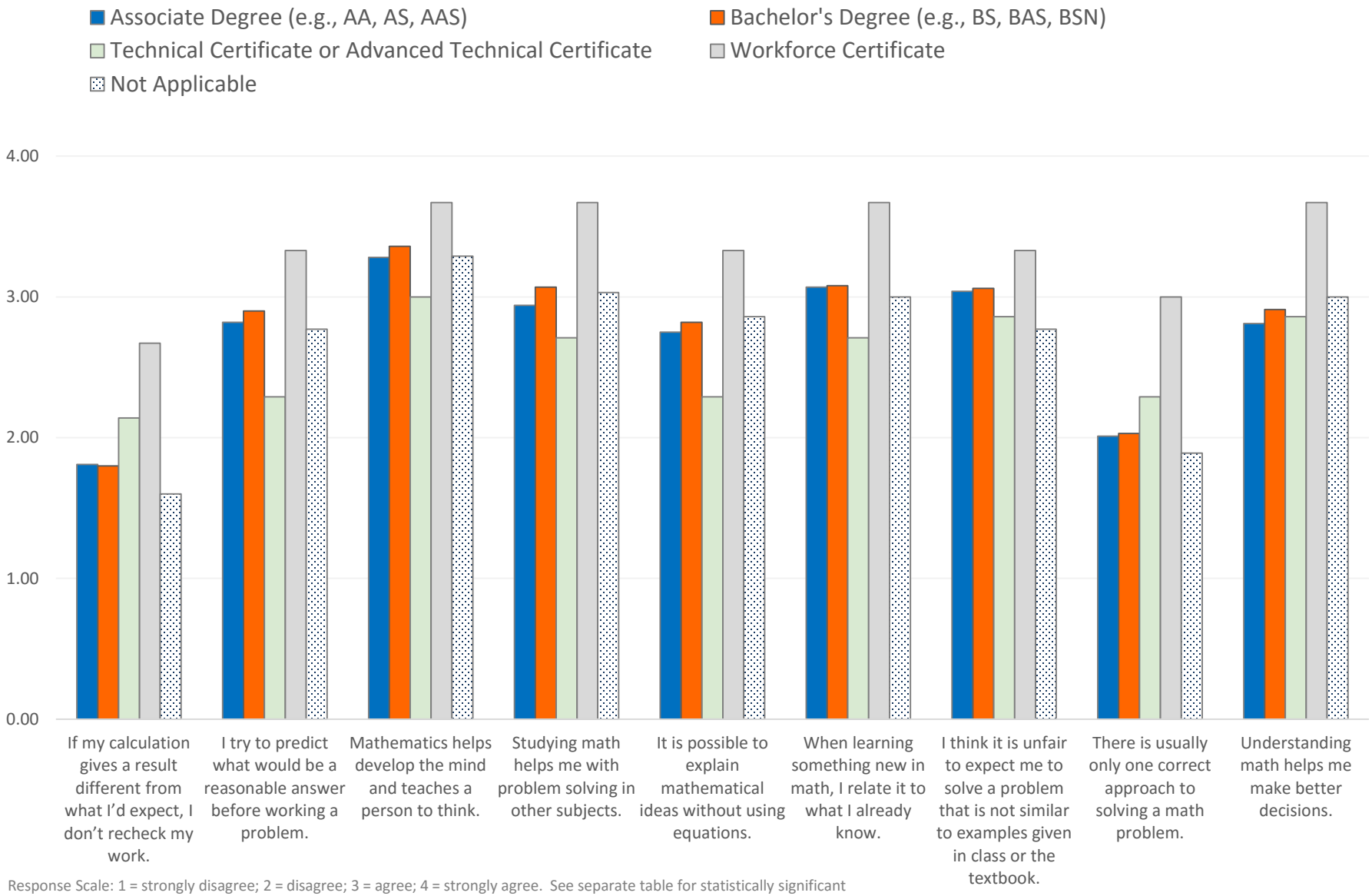
Table 11. PMSES Question 2 Results by Student Degree/Award

Q2: Thinking about studying mathematics, indicate the extent to which you agree with each of the following statements.	Which of the following best describes the award that you are currently working to complete?									
	Associate Degree (e.g., AA, AS, AAS)		Bachelor's Degree (e.g., BS, BAS, BSN)		Technical Certificate or Advanced Technical Certificate		Workforce Certificate		Not Applicable	
	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	2.67a	3	1.60a	35
I 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	3.07a	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	2.71a	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.	2.01a	1042	2.03a	213	2.29a	7	3.00a	3	1.89a	35
Understanding math helps me make better decisions.	2.81a	1042	2.91a	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.



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.

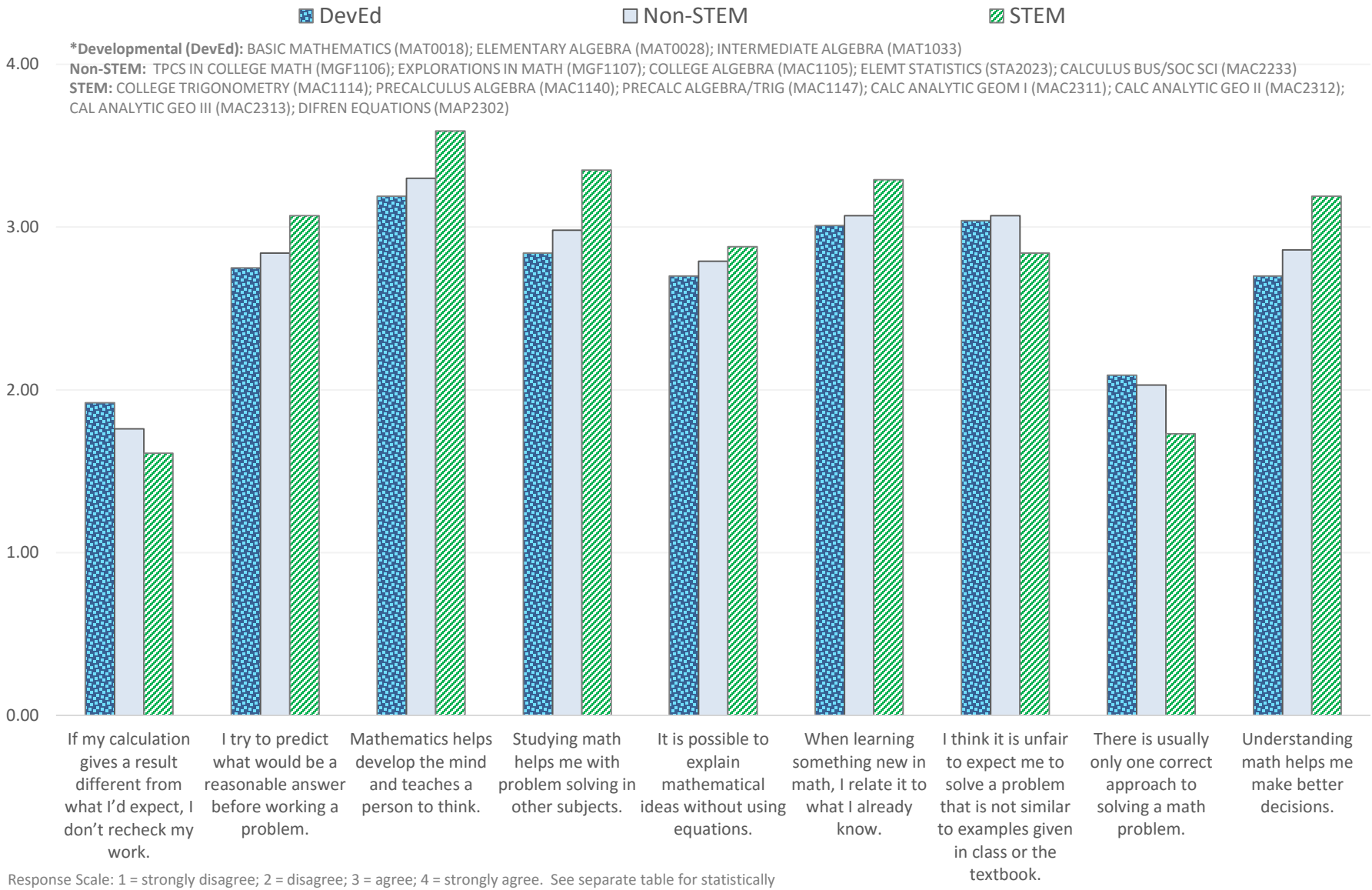
Table 12. PMSES Question 2 Results by STEM Course Classification Category

Q2: Thinking about studying mathematics, indicate the extent to which you agree with each of the following statements.	STEM Category*							
	DevEd		Non-STEM		STEM		Total	
	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	1.76b	615	1.61b	153	1.81	1313
I try to predict what would be a reasonable answer before working a problem.	2.75a	545	2.84a	615	3.07b	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.	3.01a	545	3.07a	615	3.29b	153	3.07	1313
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	545	3.07a	615	2.84b	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	2.86b	615	3.19c	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.



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)

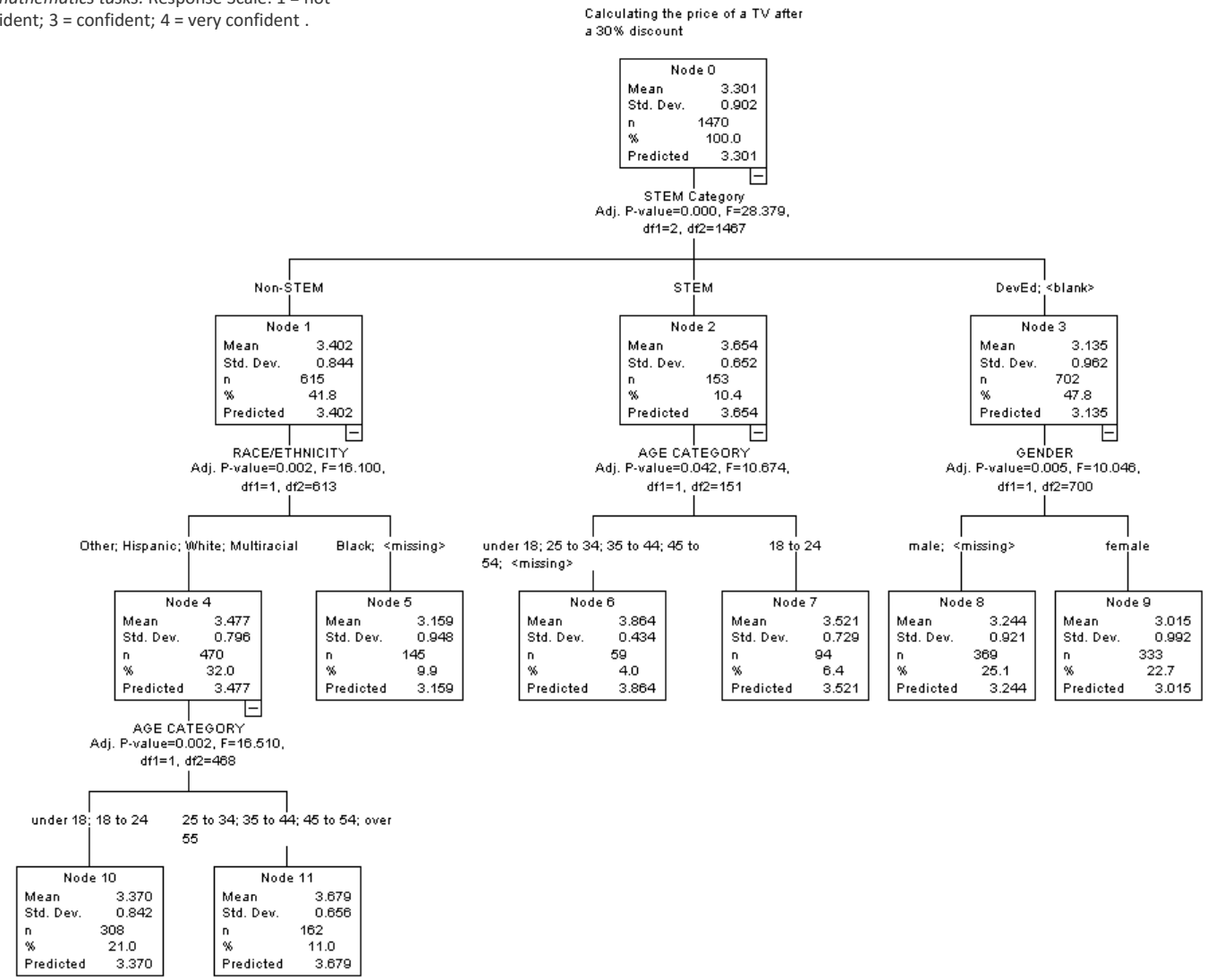
CHAID Analysis

- 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.

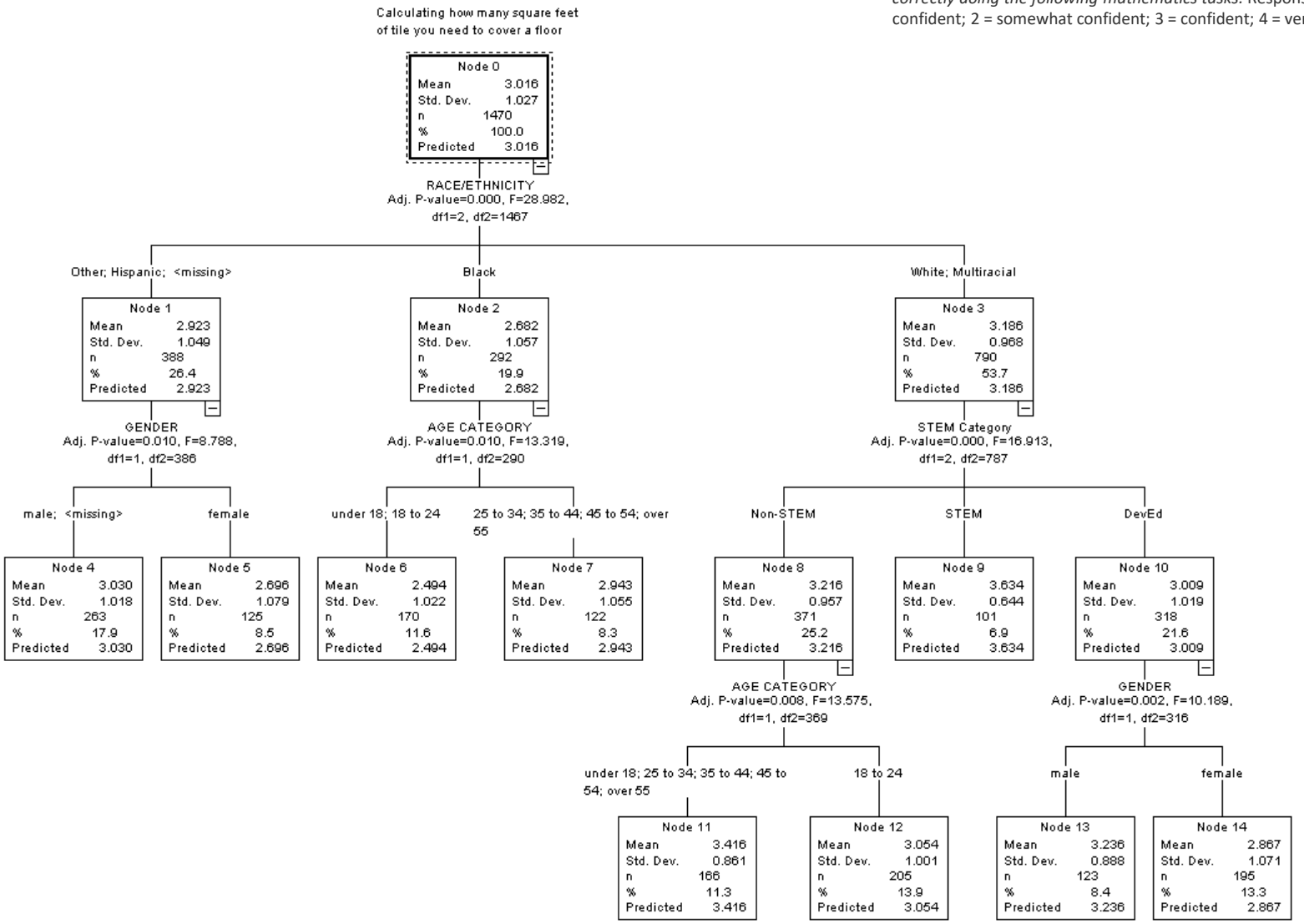
CHAID Q1.1: Calculating the price of a TV after a 30% discount

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 .



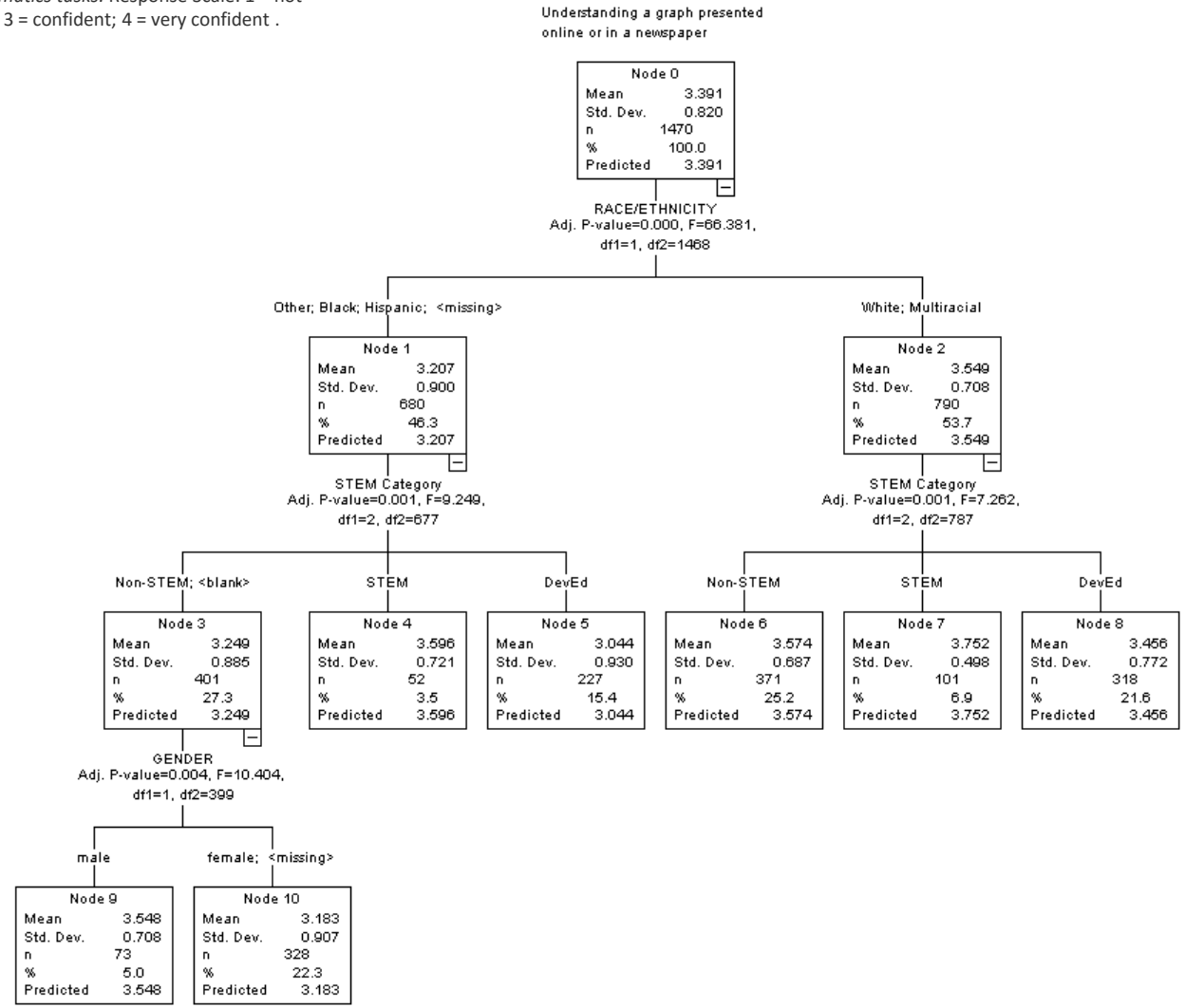
CHAID Q1.2: Calculating how many square feet of tile you need to cover a floor

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 .



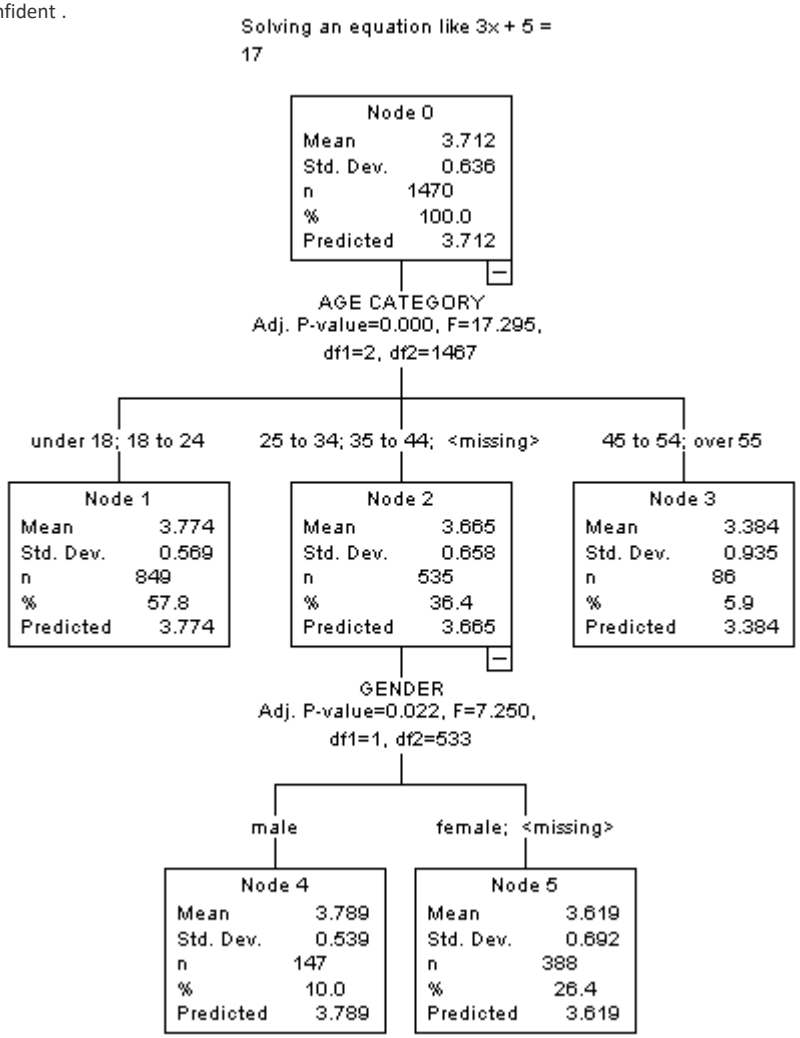
CHAID Q1.3: Understanding a graph presented online or in a newspaper

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 .



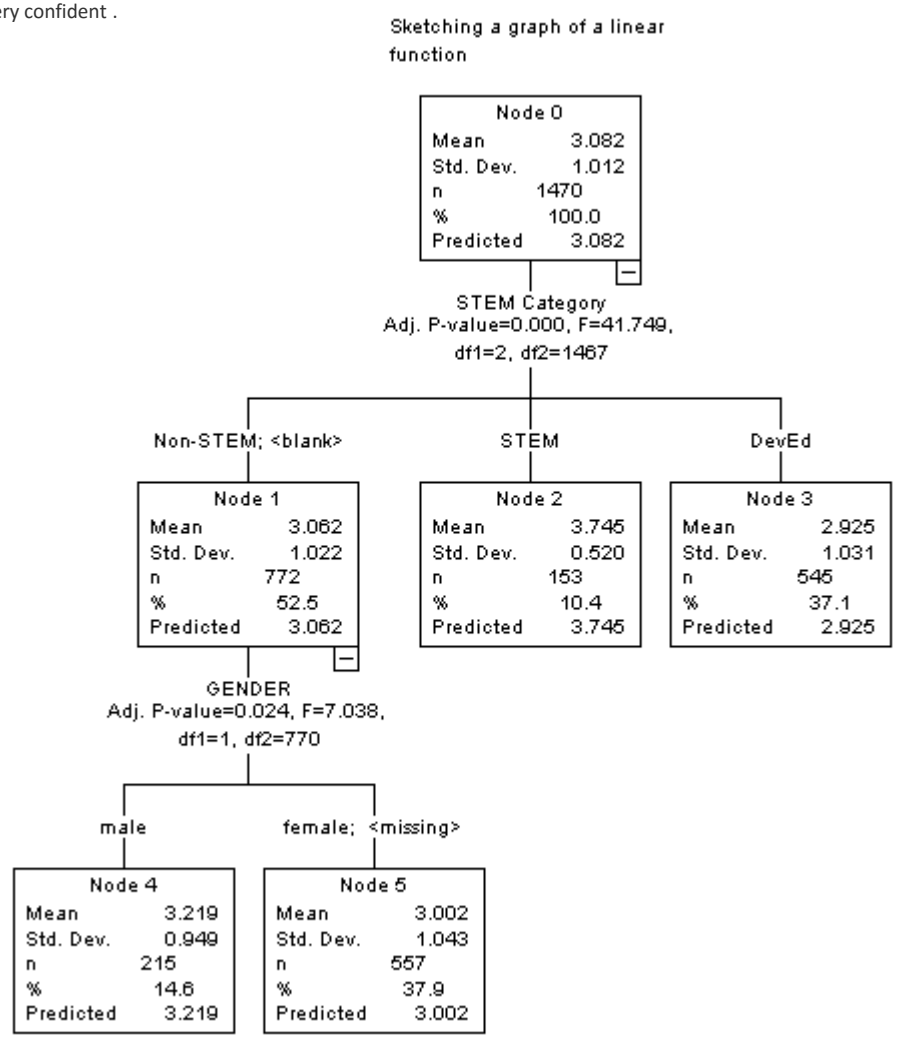
CHAID Q1.4: Solving an equation like 3x + 5 = 17

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 .



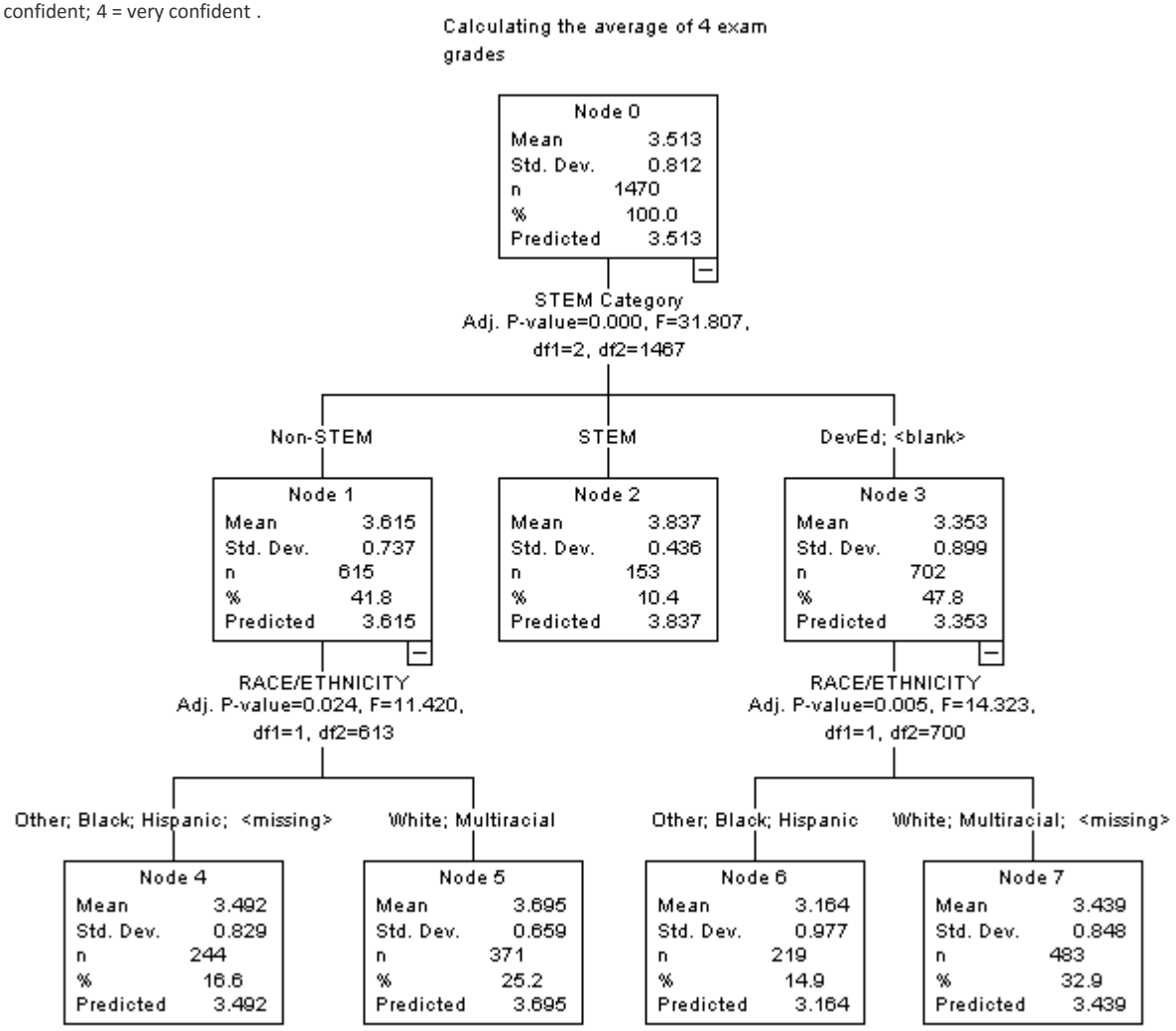
CHAID Q1.5: Sketching a graph of a linear function

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 .



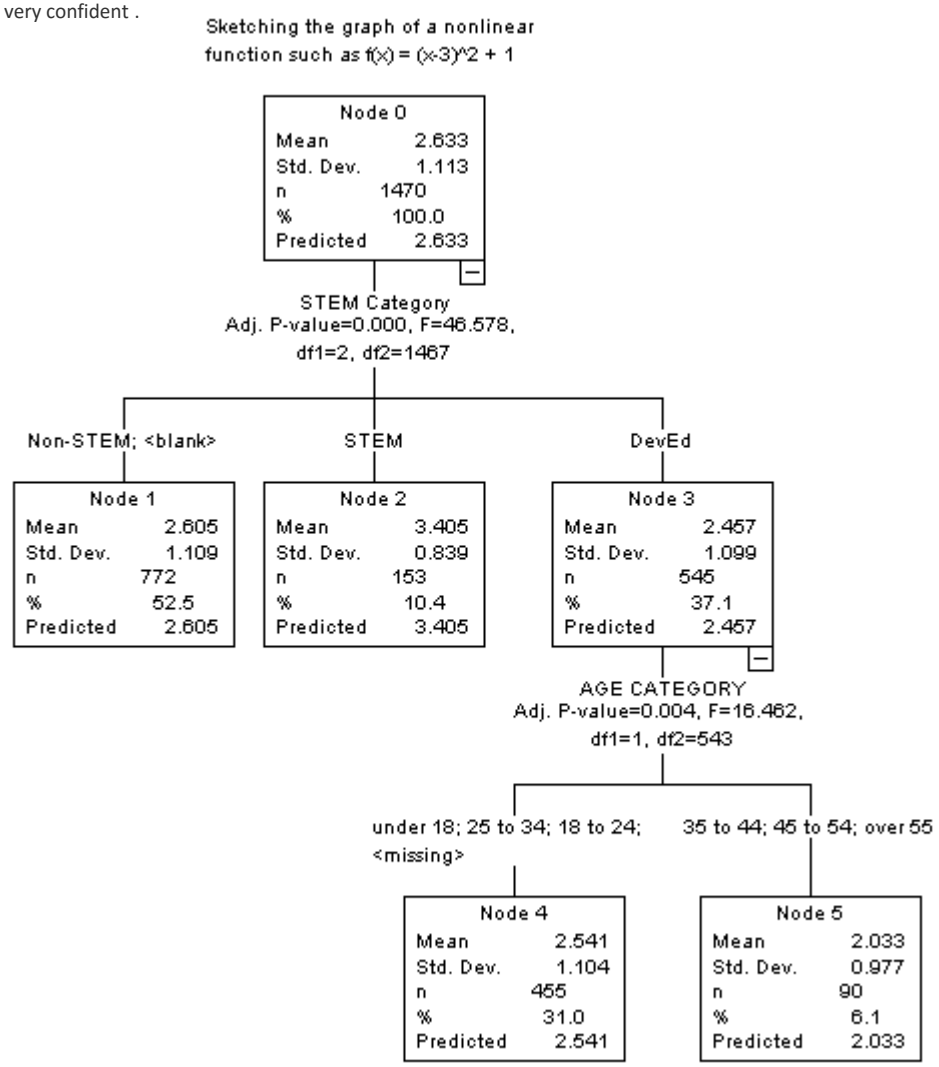
CHAID Q1.6: Calculating the average of 4 exam grades

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 .



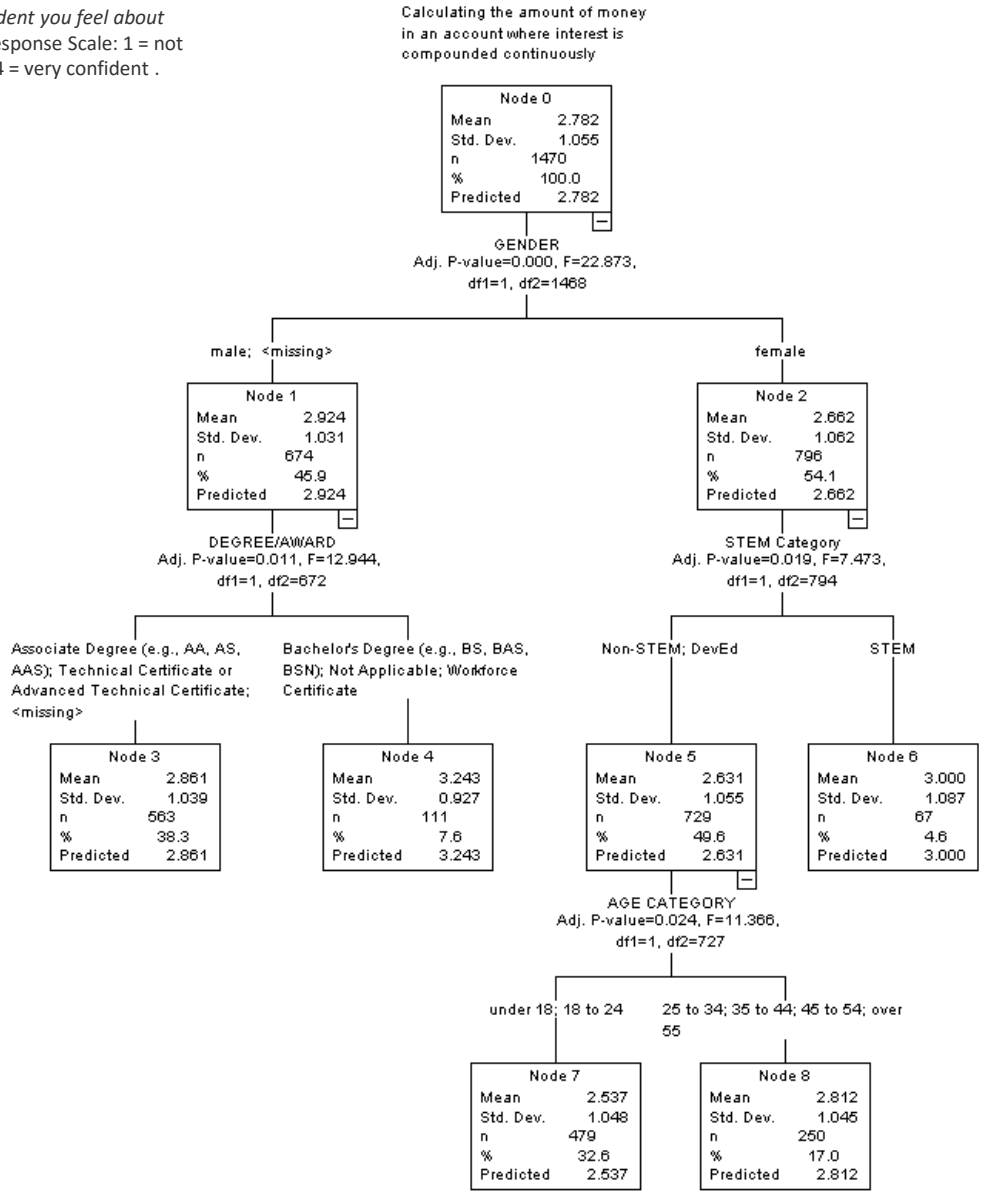
CHAID Q1.7: Sketching the graph of a nonlinear function such as $f(x) = (x-3)^2 + 1$

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 .



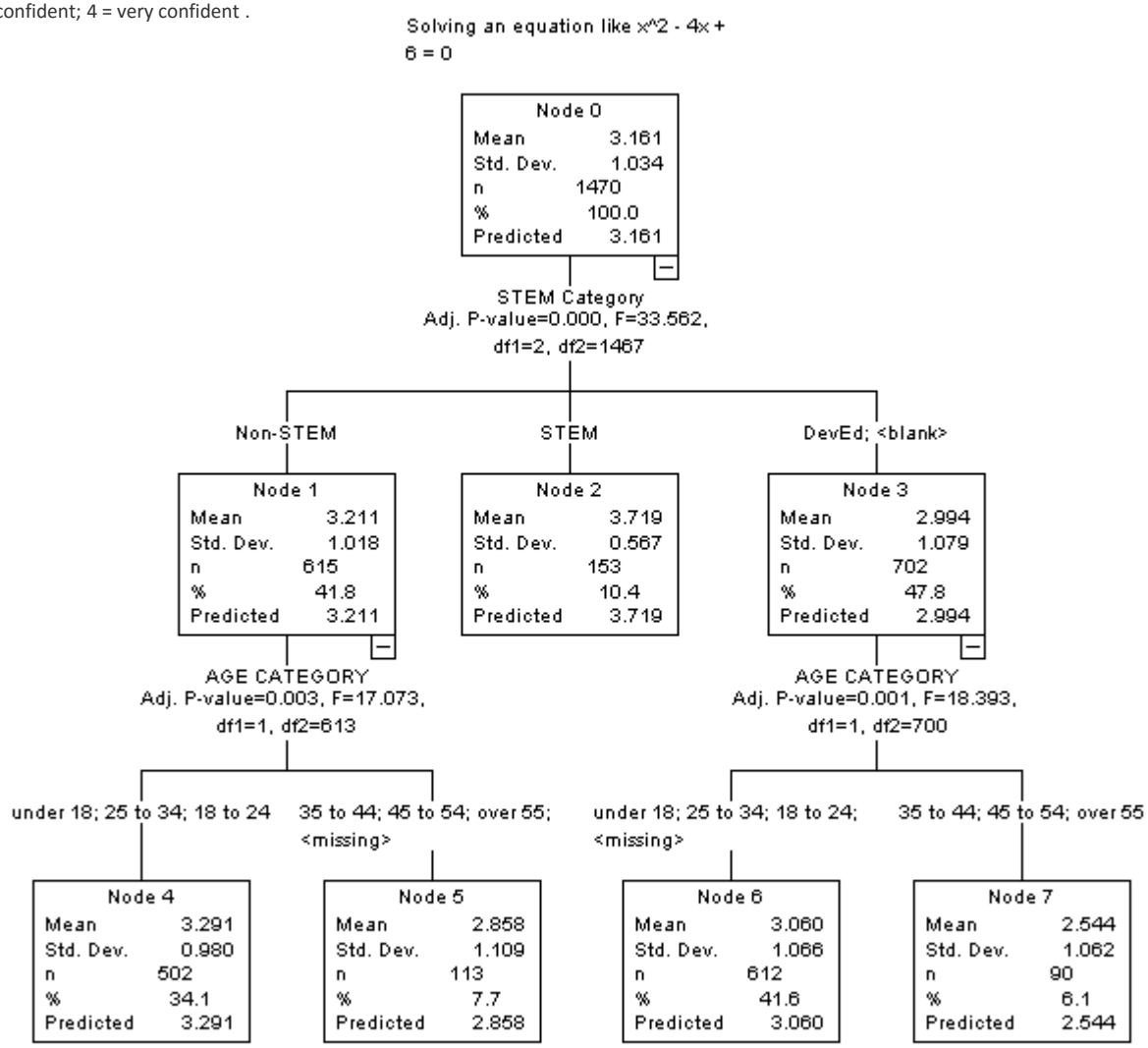
CHAID Q1.8: Calculating the amount in an account with continuous compounding

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 .



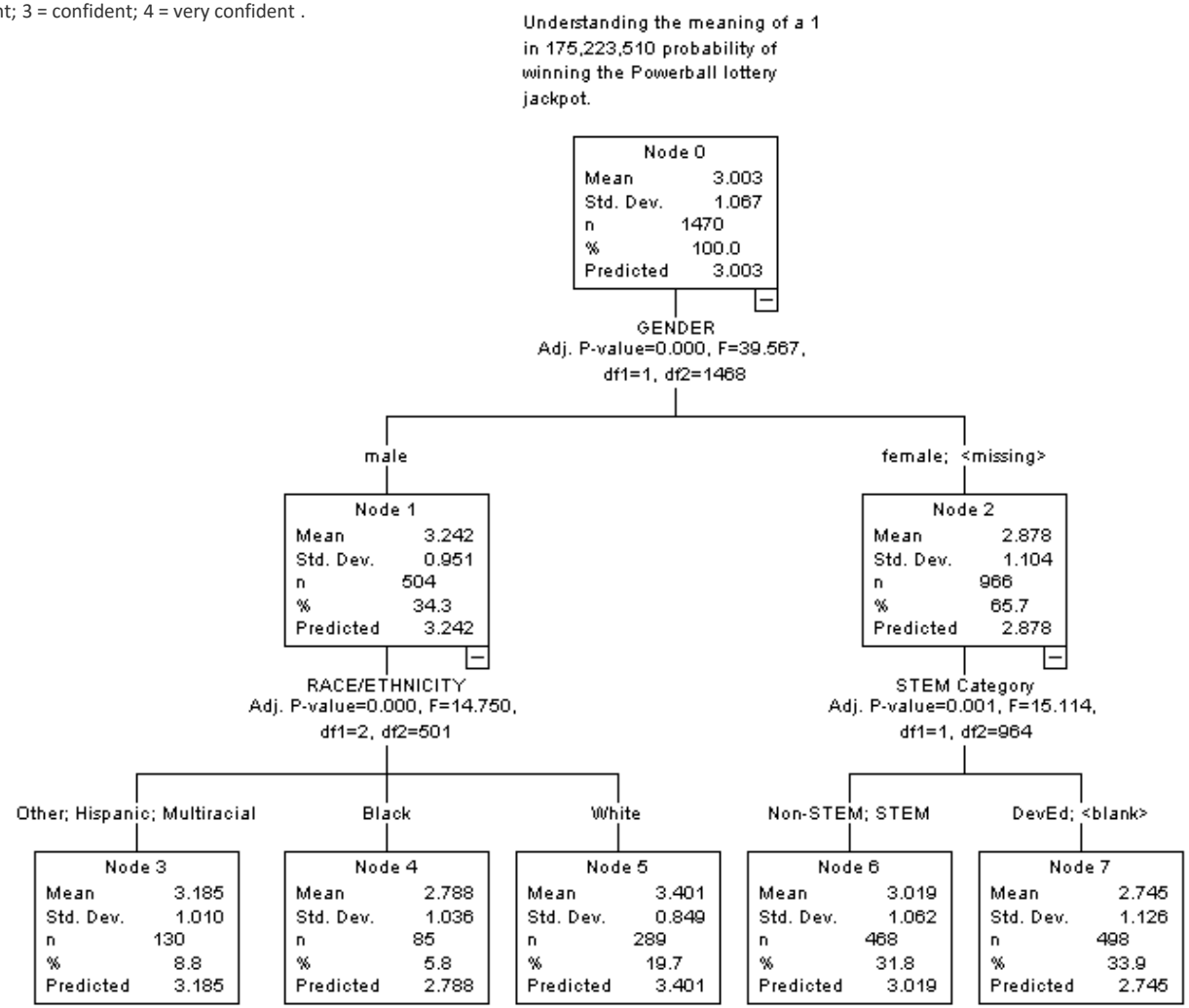
CHAID Q1.9: Solving an equation like $x^2 - 4x + 6 = 0$

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 .



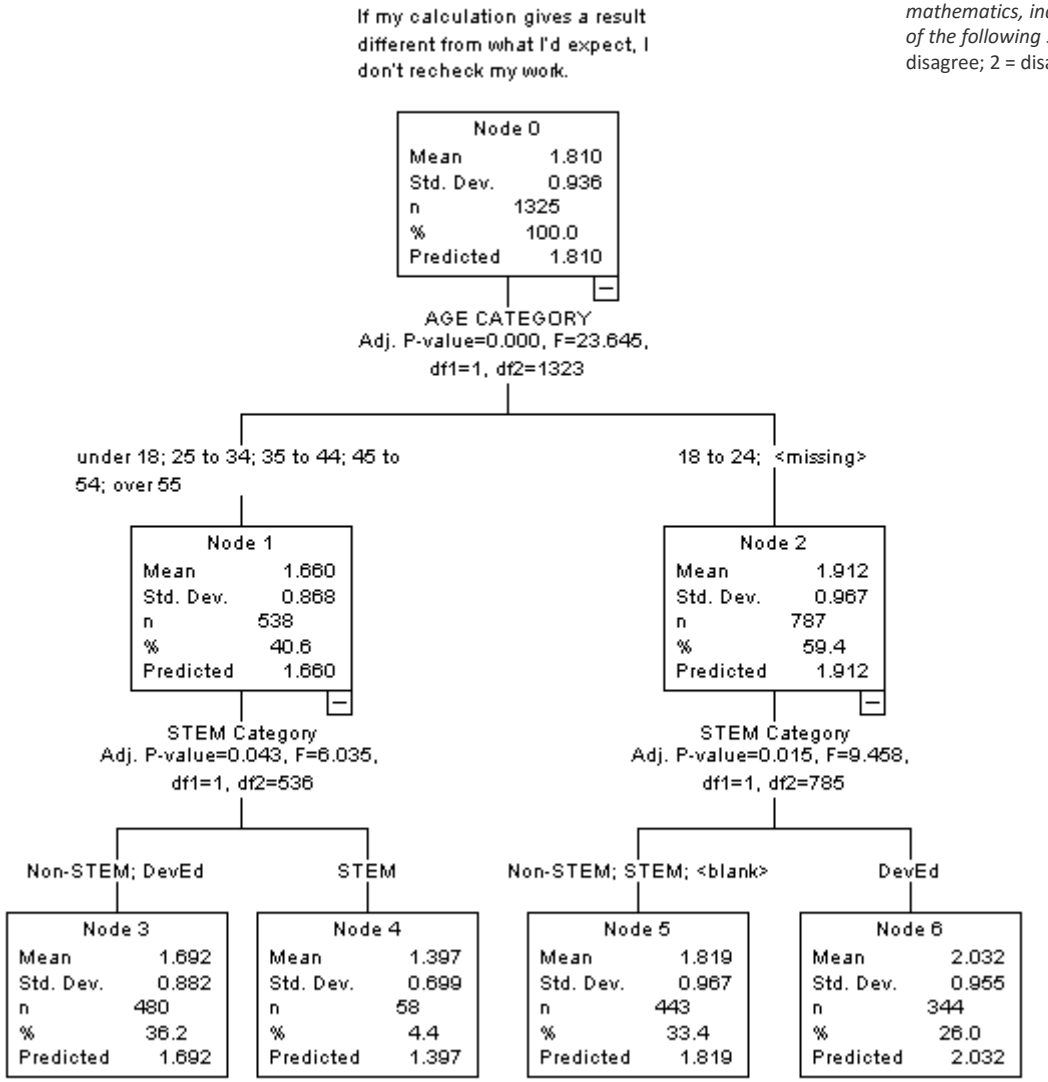
CHAID Q1.10: Understanding a 1 in 175,223,510 probability of winning the Powerball.

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 .

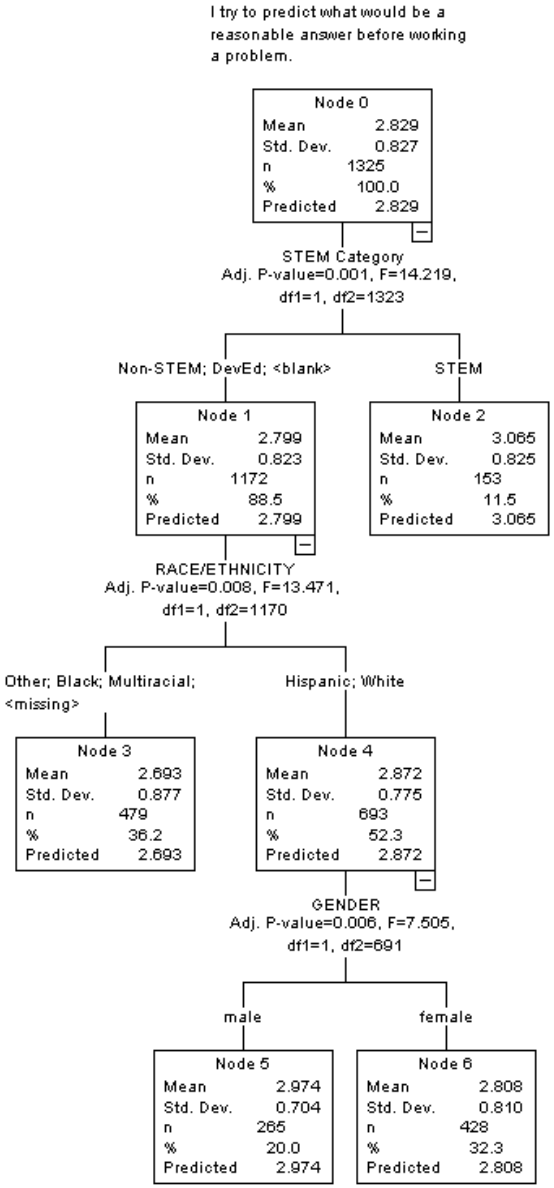


CHAID Q2.1: If my calculation gives a result different from what I'd expect, I don't recheck my work.

Source: 2018 FSCJ PMSES. Item: *Thinking about studying mathematics, indicate the extent to which you agree with each of the following statements.* Response Scale: 1 = strongly disagree; 2 = disagree; 3 = agree; 4 = strongly agree



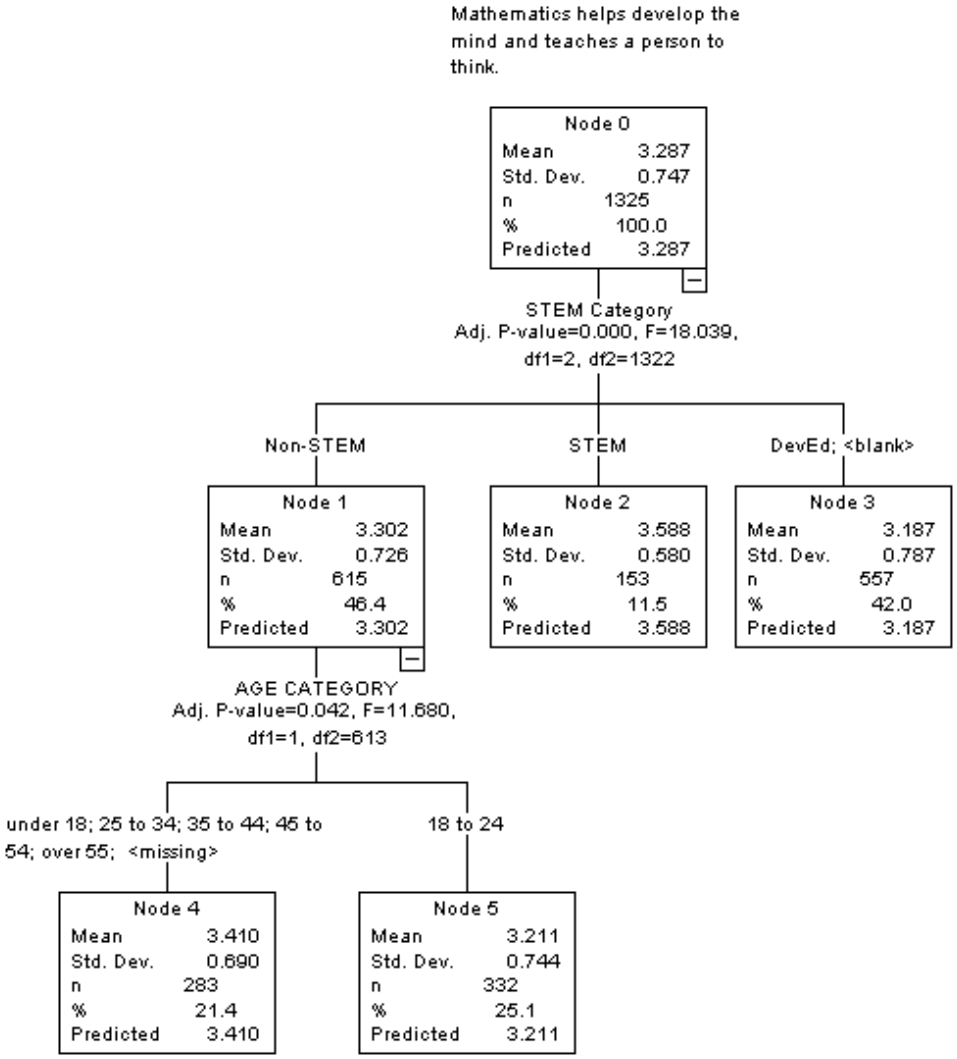
CHAID Q2.2: I try to predict what would be a reasonable answer before working a problem.



Source: 2018 FSCJ PMSES. Item: *Thinking about studying mathematics, indicate the extent to which you agree with each of the following statements.* Response Scale: 1 = strongly disagree; 2 = disagree; 3 = agree; 4 = strongly agree

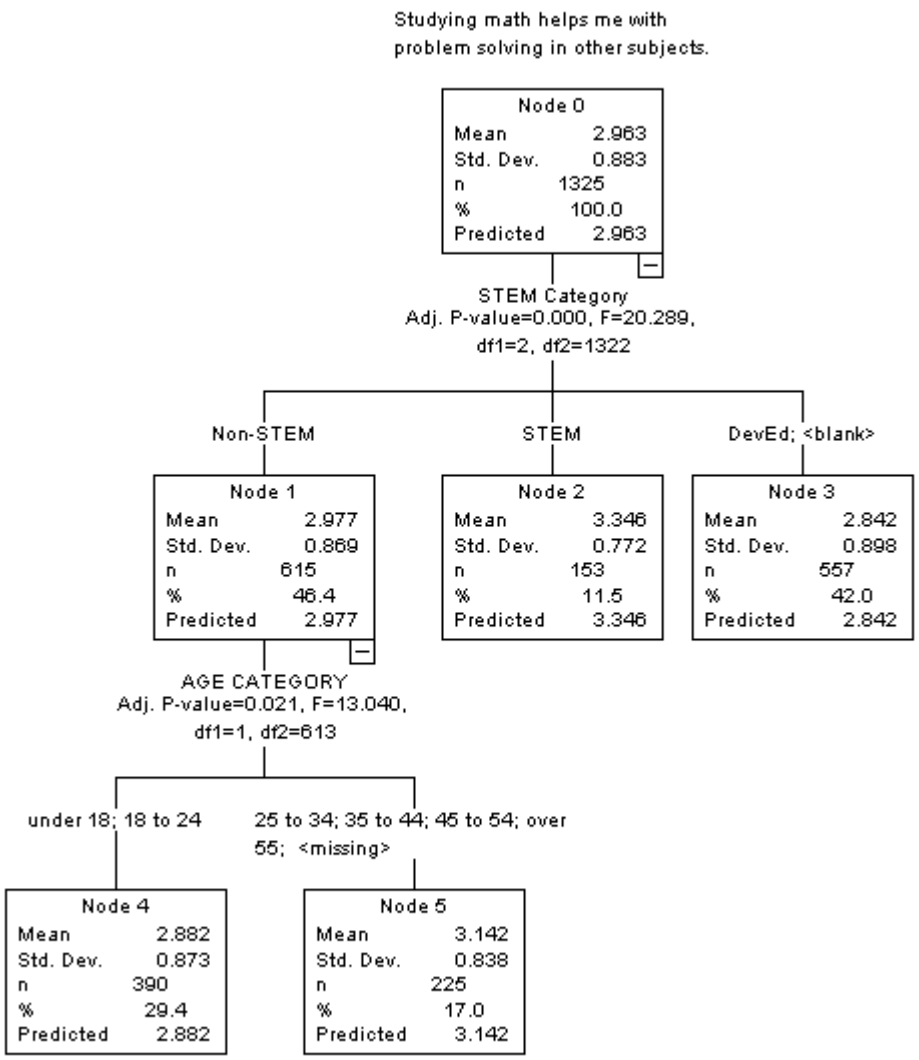
CHAID Q2.3: Mathematics helps develop the mind and teaches a person to think.

Source: 2018 FSCJ PMSES. Item: *Thinking about studying mathematics, indicate the extent to which you agree with each of the following statements.* Response Scale: 1 = strongly disagree; 2 = disagree; 3 = agree; 4 = strongly agree



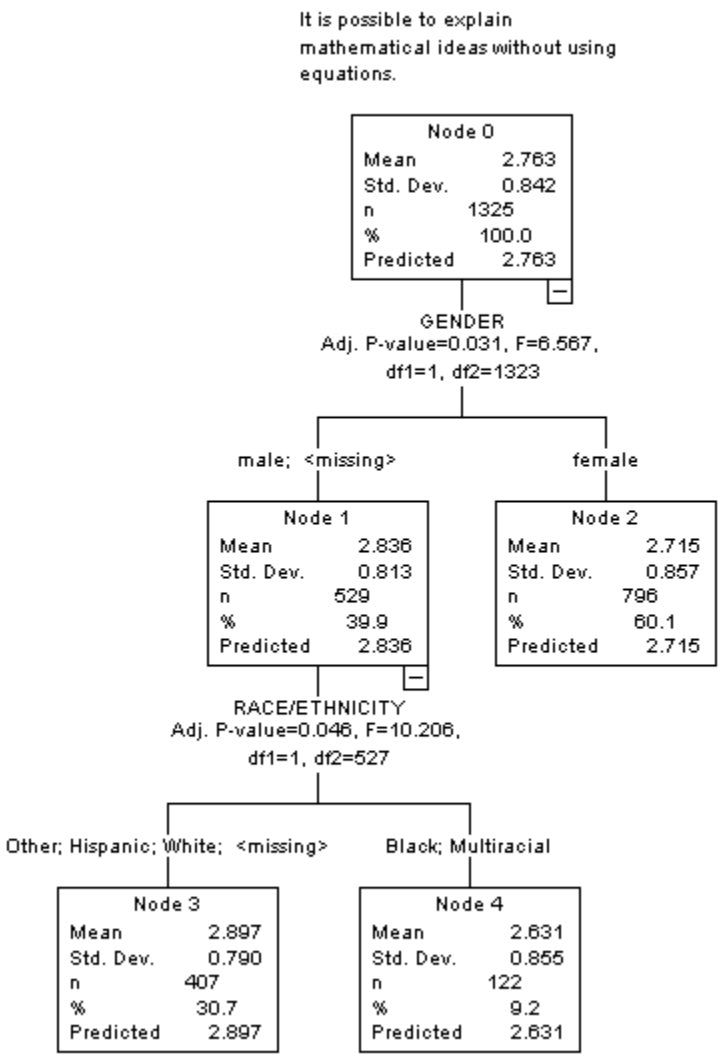
CHAID Q2.4: Studying math helps me with problem solving in other subjects.

Source: 2018 FSCJ PMSES. Item: *Thinking about studying mathematics, indicate the extent to which you agree with each of the following statements.* Response Scale: 1 = strongly disagree; 2 = disagree; 3 = agree; 4 = strongly agree



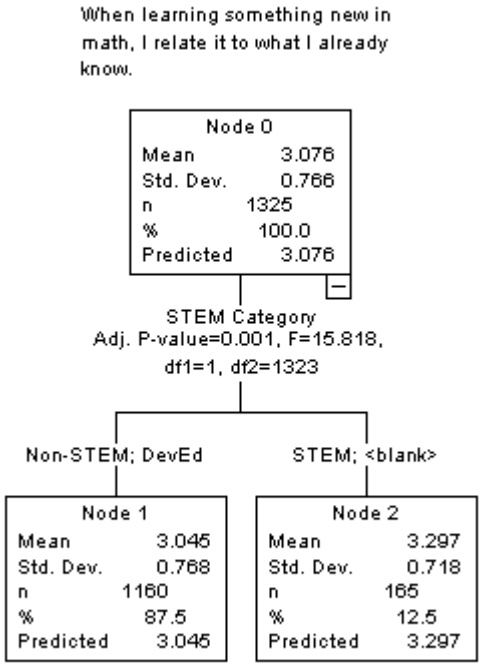
CHAID Q2.5: It is possible to explain mathematical ideas without using equations.

Source: 2018 FSCJ PMSES. Item: *Thinking about studying mathematics, indicate the extent to which you agree with each of the following statements.* Response Scale: 1 = strongly disagree; 2 = disagree; 3 = agree; 4 = strongly agree



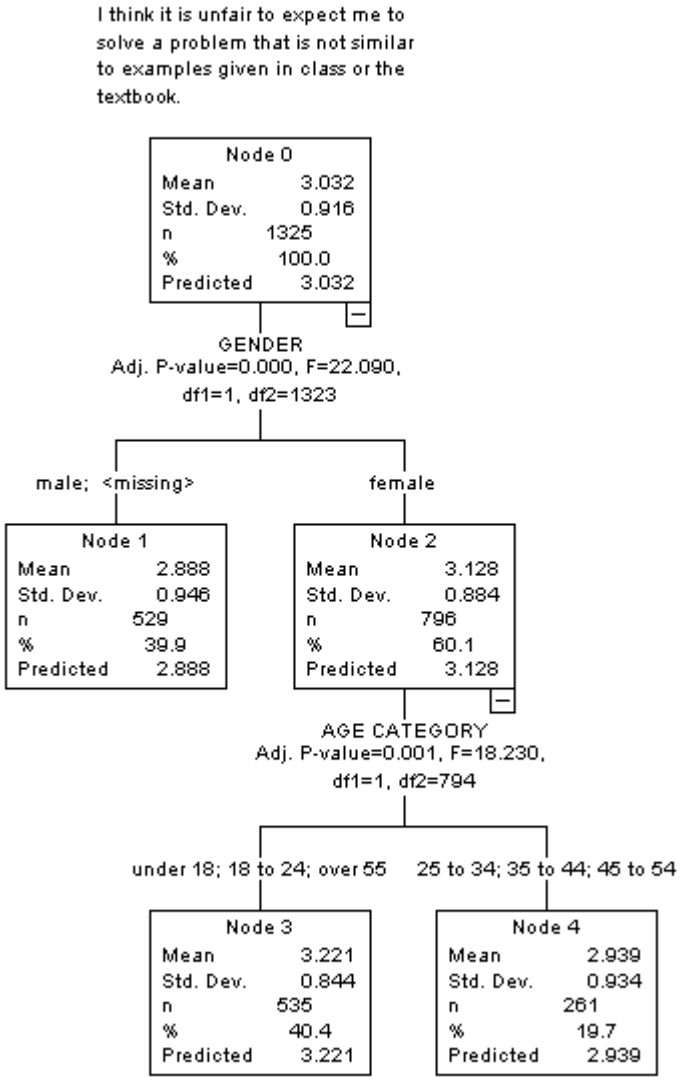
CHAID Q2.6: When learning something new in math, I relate it to what I already know.

Source: 2018 FSCJ PMSES. Item: *Thinking about studying mathematics, indicate the extent to which you agree with each of the following statements.* Response Scale: 1 = strongly disagree; 2 = disagree; 3 = agree; 4 = strongly agree



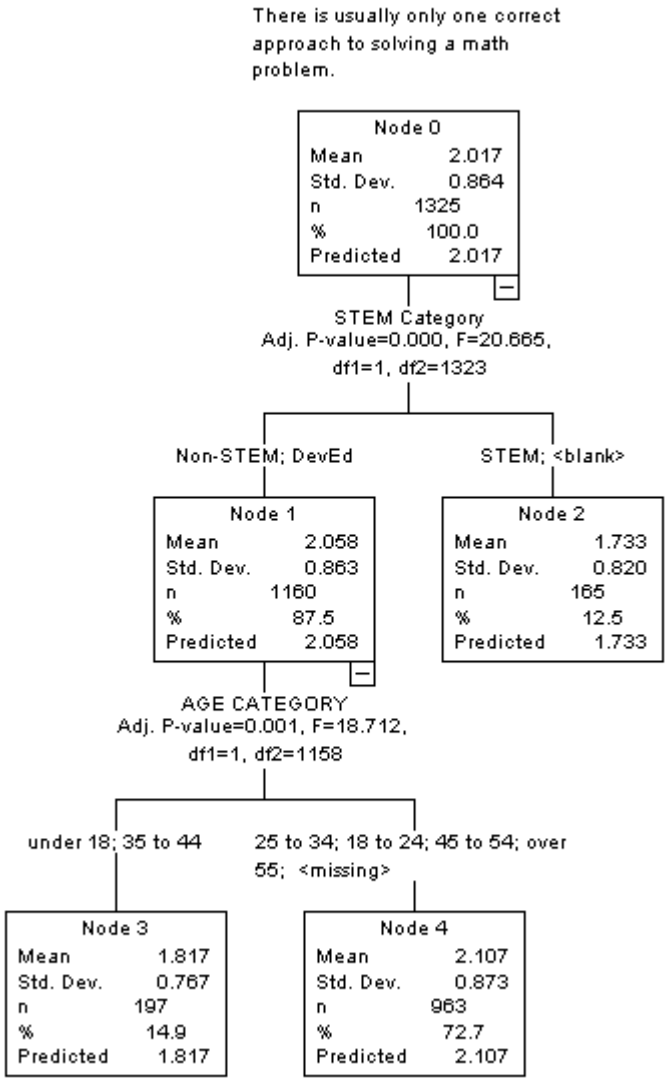
CHAID Q2.7: I think it is unfair to expect me to solve a problem that is not similar to examples given in class or the textbook.

Source: 2018 FSCJ PMSES. Item: *Thinking about studying mathematics, indicate the extent to which you agree with each of the following statements.* Response Scale: 1 = strongly disagree; 2 = disagree; 3 = agree; 4 = strongly agree

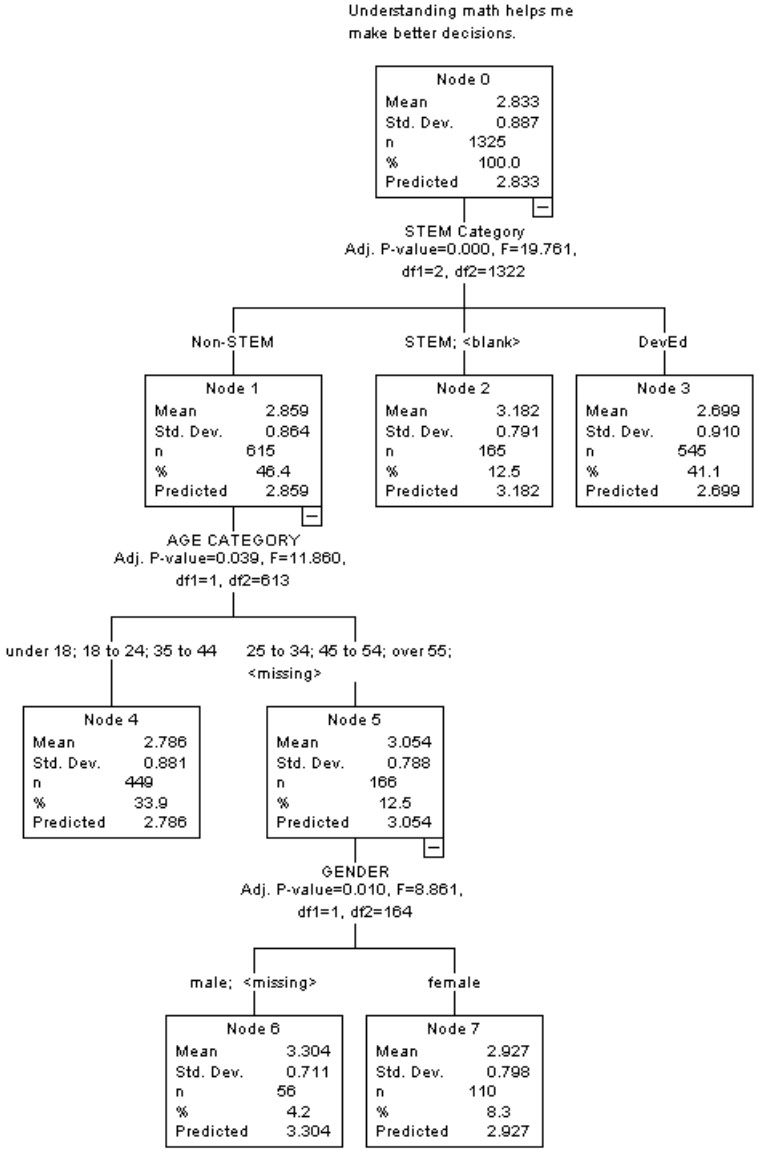


CHAID Q2.8: There is usually only one correct approach to solving a math problem.

Source: 2018 FSCJ PMSES. Item: *Thinking about studying mathematics, indicate the extent to which you agree with each of the following statements.* Response Scale: 1 = strongly disagree; 2 = disagree; 3 = agree; 4 = strongly agree



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



Source: 2018 FSCJ PMSES. Item: *Thinking about studying mathematics, indicate the extent to which you agree with each of the following statements.* Response Scale: 1 = strongly disagree; 2 = disagree; 3 = agree; 4 = strongly agree

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	

*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-ETHNICITY	AGE CATEGORY	STEM CATEGORY	DEGREE-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 Institutional Effectiveness and Accreditation and Strategic Planning, 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).