CO-REQUISITE YEAR 1 ANALYSIS

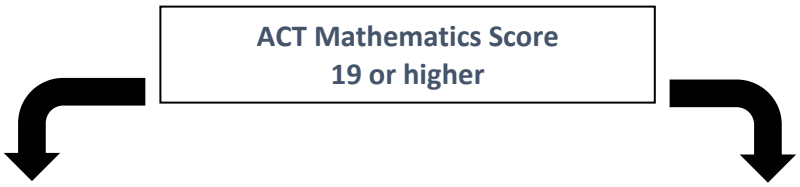
2017-2018 AY

Beginning in fall 2017 RSU initiated a new model for completion of developmental mathematics and writing for students with ACT scores that are marginally below the required ACT of 19 (or equivalent through Accuplacer secondary testing) for the mathematics and/or English ACT sub-tests. The initiative is in conjunction with the Complete College America (CCA) Oklahoma State Regents for Higher Education (OSRHE) *Scaling Co-requisite Initiative*. Qualifying students are afforded the option to take MATH 1503 or MATH 1513 as a traditional college-level course, while concurrently receiving remedial instruction in a mandatory MATH 0312 College Math Foundations or MATH 0412 College Algebra Foundations. Similarly, students who score 17 or 18 on the ACT English sub-test (or the Accuplacer secondary placement test equivalent) are eligible to enroll directly in Comp I if and only if they simultaneously enroll in ENGL 0111 – Comp I Supplemental. The supplemental courses are an additional two hours of instruction each week designed to address specific competencies intended to mitigate mathematics and writing deficiencies.

Following the Dana Center Pathways through the University of Texas at Austin implementation process, RSU has successfully launched its pilot year of this initiative. This report presents an analysis of results for both mathematics and English.

RSU fully implemented an advisement culture in spring 2017 that segregates advisees into STEM and non-STEM tracts and places students in a mathematics sequence appropriate to their career aspirations. Figure 1 presents this model for all RSU degree programs.

MATHEMATICS



MATH 1513 College Algebra
or
MATH 1715 Precalculus

BS Biology
BS Nursing RN-BSN
BS Business Administration
BS Game Development
AS Biology
AS Physical Science
AA Accounting
AA Business Administration

MATH 1503 Math for Critical Thinking

BS Organizational Leadership
BS Sport Management
BS Business Information Tech
BS Justice Administration
BT Applied Technology
BA Communications
BA Liberal Arts
BFA Visual Arts
BA History
BA Military History
BA Public Affairs
BA Social Entrepreneurship
BS Community Counseling
BS Elementary Education
BS Social Science
Bachelor of General Studies (College Algebra is required for Biology and Chemistry minors)

AA Criminal Justice Studies
AS Computer Science
AA Liberal Arts
AA Secondary Education
AA Social Studies Education
AA Social Sciences
AA Elementary Education
AA Social Science

In order to assess student learning outcomes, the following research questions were asked.

1. What were the success rates in co-requisite and math pathway courses?
2. Were students, who enrolled in co-requisite math courses, as successful in college-level math courses as those who did not enroll in co-requisite courses?
    a. If not, were they as successful as students enrolled in historical, traditional developmental courses?
3. Does ACT affect co-requisite math success?

4. Did students enrolled in co-requisite math courses persist at the same rates as other students?

Results of implementation of this initiative for Year 1 are as follows:

College Algebra

- Students who enrolled in College Algebra Foundations had a *similar* success rate in College Algebra as students who:
  - Scored lower than 19 on the ACT Math subtest but waived the co-requisite with a qualifying score on the Accuplacer
  - Historically (the previous three years) completed Elementary Algebra and Intermediate Algebra prior to College Algebra
- Students who enrolled in College Algebra Foundations had a *higher* success rate in College Algebra than students who:
  - Transferred in their developmental math course from another institution
- Students who enrolled in College Algebra Foundations had a *lower* success rate in College Algebra than students who:
  - Scored 19 or higher on the ACT Math subtest
- No student who enrolled in a traditional section of Elementary Algebra or Intermediate Algebra in 2017-2018 also completed College Algebra
- A total of 164 out of 288 College Algebra Foundations students successfully completed College Algebra in 2017-2018
- The ACT Math subtest saddle point for Foundations students who successfully completed College Algebra was 15
  - An ACT Math subtest less than 15 resulted in less than 50% of students with those scores to be successful in College Algebra
- Students who successfully completed both Foundations and College Algebra persisted from fall 2017 to fall 2018 at a rate of 70%.

  - This compares favorably to an overall fall-to-fall persistence rate at RSU (fulltime and part-time students who are bachelor and associate degree-seekers) of 57%
  - This also compares favorably to an IPEDS fall-to-fall *first-time, fulltime bachelor degree-seeking* retention rate of 74%.

Mathematics for Critical Thinking

- Students who enrolled in College Math Foundations had a *similar* success rate in Mathematics for Critical Thinking as students who:
  - Scored lower than 19 on the ACT Math subtest but waived the co-requisite with a qualifying score on the Accuplacer
  - Historically (the previous three years) completed Elementary Algebra and Intermediate Algebra prior to College Algebra
- Students who enrolled in College Math Foundations had a *higher* success rate in Mathematics for Critical Thinking than students who:
  - Transferred in their developmental math course from another institution
- Students who enrolled in College Math Foundations had a *lower* success rate in Mathematics for Critical Thinking than students who:
  - Scored 19 or higher on the ACT Math subtest
- No student who enrolled in a traditional section of Elementary Algebra or Intermediate Algebra in 2017-2018 also completed Mathematics for Critical Thinking
- A total of 27 out of 73 College Math Foundations students successfully completed Mathematics for Critical Thinking in 2017-2018
- The ACT Math subtest saddle point for College Math Foundations students who successfully completed Mathematics for Critical Thinking was 19
  - An ACT Math subtest less than 19 resulted in less than 50% of students with those scores to be successful in Mathematics for Critical Thinking

    - This outcome may be due to increased math anxiety not uncommon among non-STEM majors
- Students who successfully completed both College Math Foundations and Mathematics for Critical Thinking persisted from fall 2017 to fall 2018 at a rate of 78%.
    - This compares favorably to an overall fall-to-fall persistence rate at RSU (fulltime and part-time students who are bachelor and associate degree-seekers) of 57%
    - This also compares favorably to an IPEDS fall-to-fall *first-time, fulltime bachelor degree-seeking* retention rate of 74%.

RQ1. What were the success rates in co-requisite and math pathway courses?

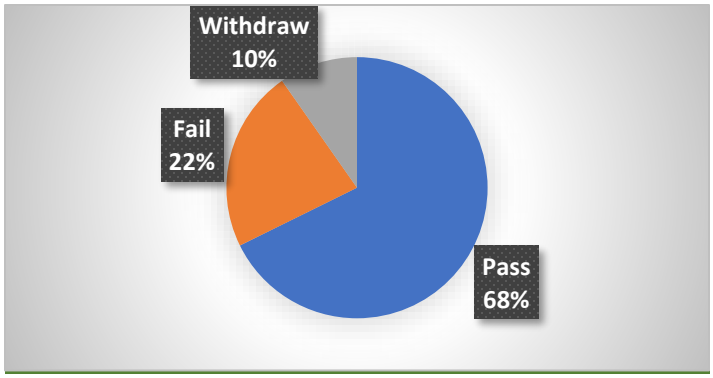
2017-2018 MATH 0114 Elementary Algebra Plus

	Frequency	Percent
A	68	26.5%
B	58	22.6%
C	48	18.7%
D	14	5.4%
F	44	17.1%
W	25	9.7%
Total	257	100%

Note: Percent may not sum to exactly 100.0% due to rounding.

67.8% successfully completed MATH 0114

2017-2018 MATH 0114 Elementary Algebra Plus



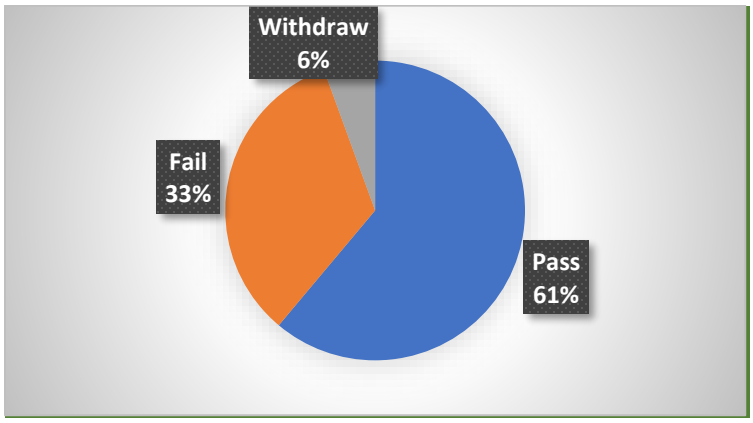
Note: 2016-2017 Success Rates for Elementary Algebra was 53.7% ABC, 38.2% DF, and 8.1% W.

MATH 0213 Intermediate Algebra

	Frequency	Percent
A	1	5.6%
B	7	38.9%
C	3	16.7%
D	0	0.0%
F	6	33.3%
W	1	5.6%
Total	18	100%

Note: Percent may not sum to exactly 100.0% due to rounding.

MATH 0213 Intermediate Algebra



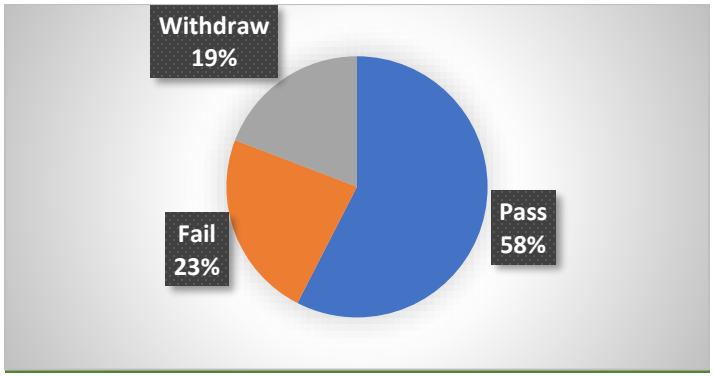
Note: 2016-2017 Success Rates for Intermediate Algebra was 58.6% ABC, 32.1% DF, and 9.3% W.

MATH 0312 College Math Foundations

	Frequency	Percent
P	42	57.5%
F	17	23.3%
W	14	19.2%
Total	73	100.0

Note: Percent may not sum to exactly 100.0% due to rounding.

MATH 0312 College Math Foundations



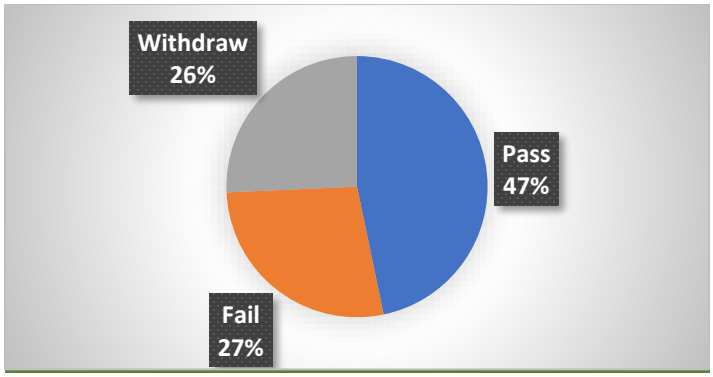
This compares to 61% success rate for Intermediate Algebra in 2017-2018 and 59% for Intermediate Algebra in 2016-2017.

MATH 1503 Mathematics for Critical Thinking TOTAL IN ANY GROUP

Grade	Frequency	Percent
A	35	16.4%
B	32	15.0%
C	33	15.4%
D	15	7.0%
F	43	20.1%
I	1	0.5%
W	55	25.7%
Total	214	100%

Note: Percent may not round to exactly 100.0% due to rounding.

MATH 1503 Mathematics for Critical Thinking TOTAL IN ANY GROUP



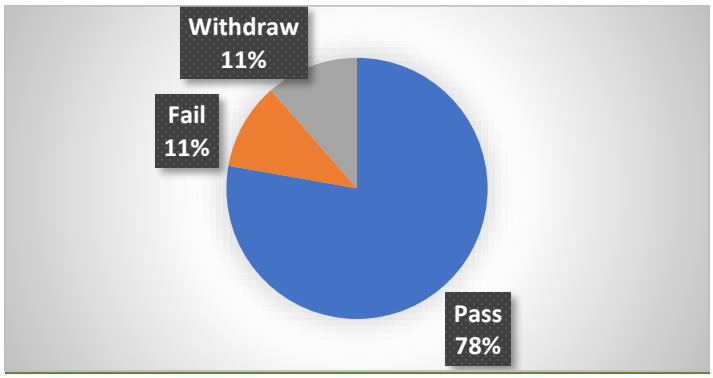
Compared to previous 3-year moving average: 77.7% Success Rate for MATH 1503 after MATH 0213 Intermediate Algebra (No data for MATH 0114 Elementary Algebra Plus). Historical Population size for MATH 1503 = 14.

MATH 0412 College Algebra Foundations

	Frequency	Percent
P	224	77.8%
F	31	10.8%
W	33	11.5%
Total	288	100%

Note: Percent may not round to exactly 100.0% due to rounding.

MATH 0412 College Algebra Foundations



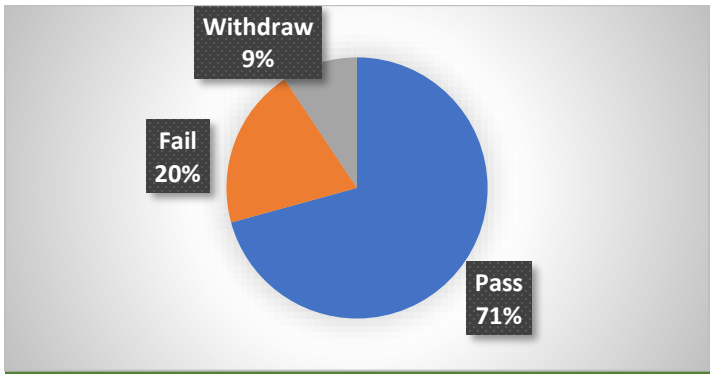
This compares with 61% success rate (ABC), 33% fail rate (DF), and 6% withdraw rate in Intermediate Algebra in 2017-2018.

MATH 1513 College Algebra TOTAL IN ANY GROUP

	Frequency	Percent
A	254	27.6%
B	190	20.7%
C	206	22.4%
D	71	7.7%
F	111	12.1%
I	1	0.1%
W	86	9.4%
Total	919	100%

Note: Percent may not sum to exactly 100.0% due to rounding.

MATH 1513 College Algebra TOTAL IN ANY GROUP



RQ2. Were students, who enrolled in co-requisite math courses, as successful in college-level math courses as those who did not enroll in co-requisite courses?

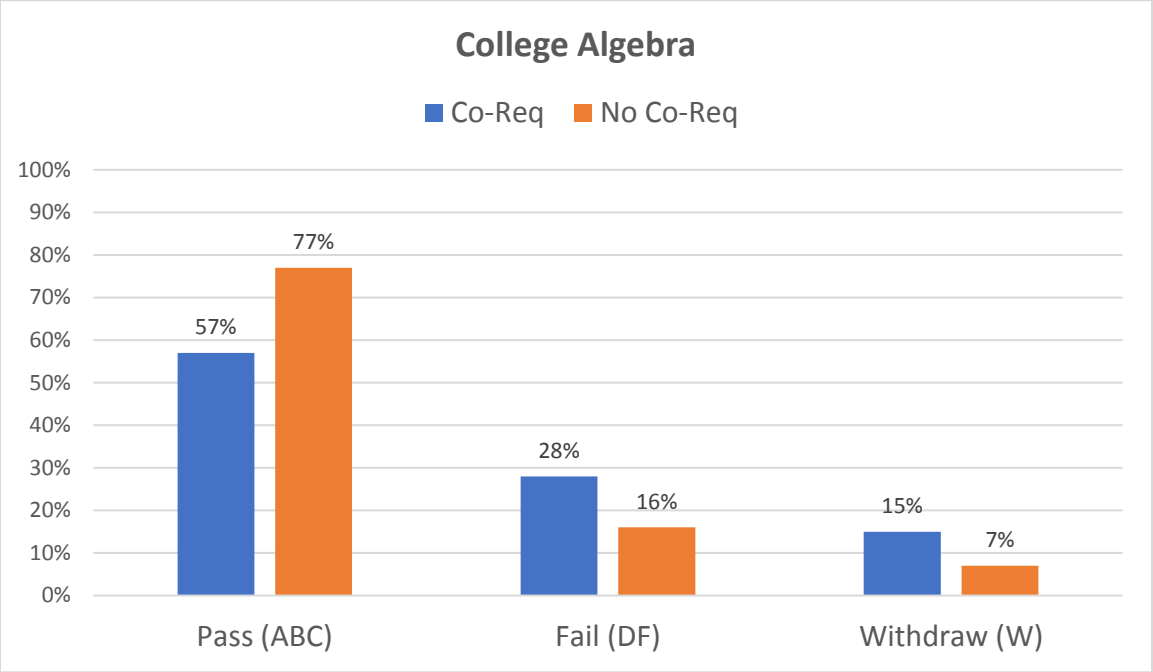
a. If not, were they as successful as students in historical, traditional developmental courses?

College Algebra: Comparison of Co-Requisite vs. Non Co-Requisite Groups

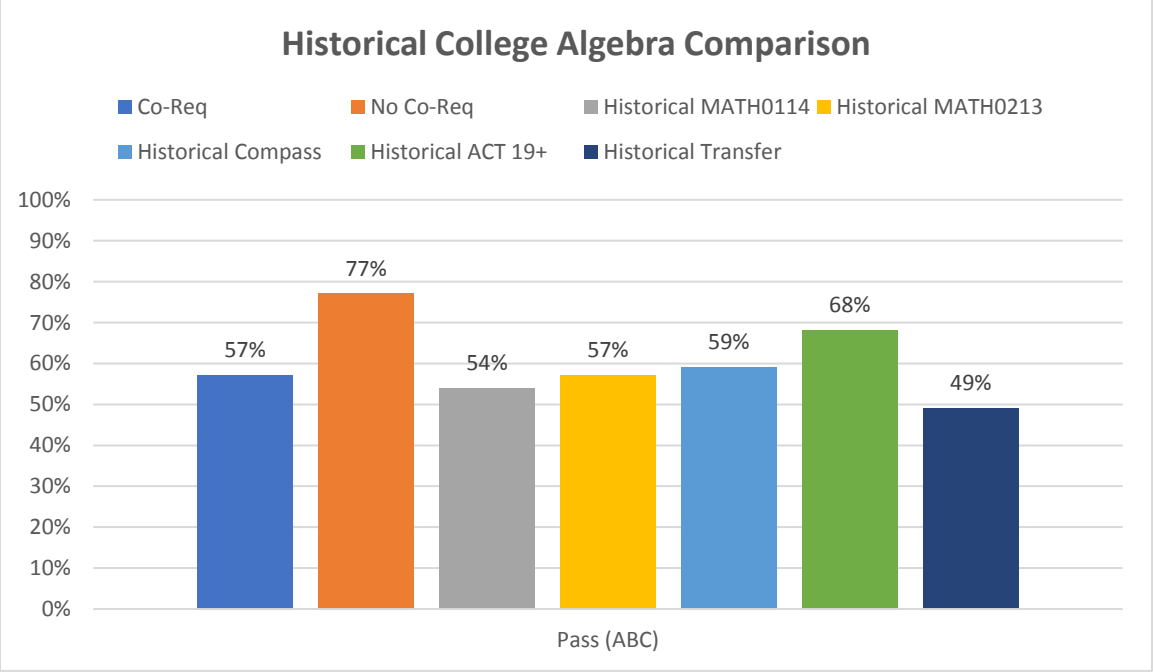
		College Algebra Groups		Total
		Co-Requisite Group for College Algebra	Non Co-Requisite Group for College Algebra	
MATH 1513 College Algebra	A	48	206	254
	B	41	149	190
	C	75	131	206
	D	31	40	71
	F	49	62	111
	I	0	1	1
	W	44	42	86
Total		288	631	919

Note: Percent may not sum to exactly 100.0% due to rounding.

College Algebra Success Rate by Co-Requisite vs. Non-Co-Requisite Status

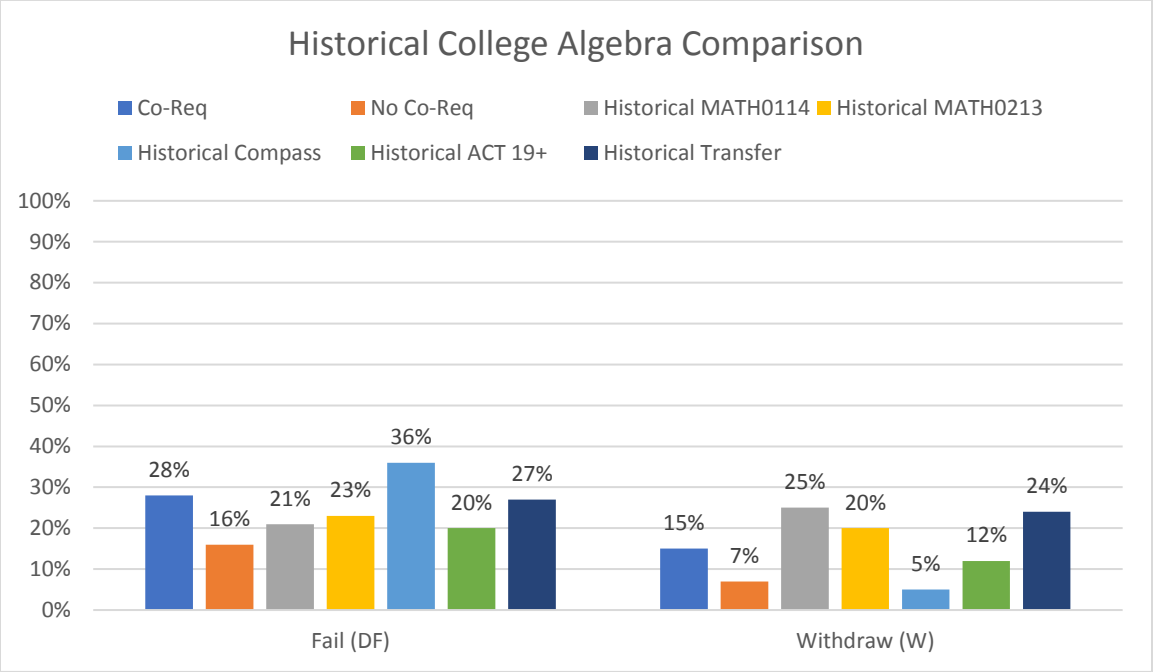


College Algebra Success Rate by All Groups



Mean historical success rate for developmental or Compass-waived: 57%

College Algebra Non-Success Rate by All Groups



Mean historical failure rate for developmental or Compass-waived: 27%
Mean historical withdrawal rate for developmental or Compass-waived: 17%

College Algebra Foundations (MATH 0412) Prediction of Success in College Algebra MATH 1513)

	Did Not Pass MATH 1513	***Passed MATH 1513***
Passed MATH 0412	False Positives 24.0%	True Positives 53.8%
Did Not Pass MATH 0412	True Negatives 19.1%	False Negatives 3.1%

College Algebra Pathway Conclusion: Students enrolled in Co-requisite MATH 0412 Foundations of College Algebra were equally likely to successfully complete College Algebra in 2017-2018 as historical developmental and/or Compass-waived students, and did so within the same semester. As evidence, a majority (53.8%) of Foundations students successfully completed College Algebra in 2017-2018.

Directions for Future Study: Because 2017-2018 was the first year that Math for Critical Thinking became the requirement for non-STEM majors, the composition of the MATH 1513 student population may have changed as students enrolled in MATH 1503 as non-STEM majors.

RA3. Does ACT affect co-requisite math success?

College Algebra: For 288 students who enrolled in MATH0412

ACT MATH * MATH1513successforLogisticRegression Crosstabulation				
		MATH1513successforLogisticRegression		Total
		Did Not Pass MATH1513	Passed MATH1513	
ACT MATH	10	1	0	1
	11	2	0	2
	13	4	1	5
	14	10	4	14
	15	19	24	43
	16	34	37	71
	17	28	41	69
	18	18	37	55
	21	1	0	1
	22	0	1	1
Total		117	145	262

Note: Percent may not sum to exactly 100.0% due to rounding.

Saddle Point at ACT Math = 15

Results suggest that MATH 0412 predicts success for more than half of students with ACT Math scores of 15 and higher.

RA4. Did students enrolling in co-requisite math courses persist at the same rates as other students?

College Algebra:

Enrolled FA2018 * MATH1513successforLogisticRegression Crosstabulation				
		MATH1513successforLogisticRegression		Total
		Did not Pass MATH1513	Passed MATH1513	
Enrollment in FA2018	Did Not Enroll in Fall 2018	64 (51.6%)	50 (30.5%)	114
	Enrolled Fall 2018	60 (48.4%)	114 (69.5%)	174
Total		124	164	288

Note: Percent may not sum to exactly 100.0% due to rounding.

Mean fall-to-fall retention rate for fall 2017 FTFT bachelor degree-seeking freshmen was 74%. MATH 1513 retention includes part-time and full-time as well as associate and bachelor degree-seeking students.

This means that a majority (52%) of co-requisite College Algebra Foundations students who did not pass College Algebra in 2017-2018 did not re-enroll during Fall 2018. Comparatively, 70% of co-requisite College Algebra Foundations students who did pass College Algebra in 2017-2018 persisted into fall 2018. This is a significant difference at the 95% confidence level (Chi Square test).

RQ2. Were students, who enrolled in co-requisite math courses, as successful in college-level math courses as those who did not enroll in co-requisite courses?

a. If not, were they as successful as students in historical, traditional developmental courses?

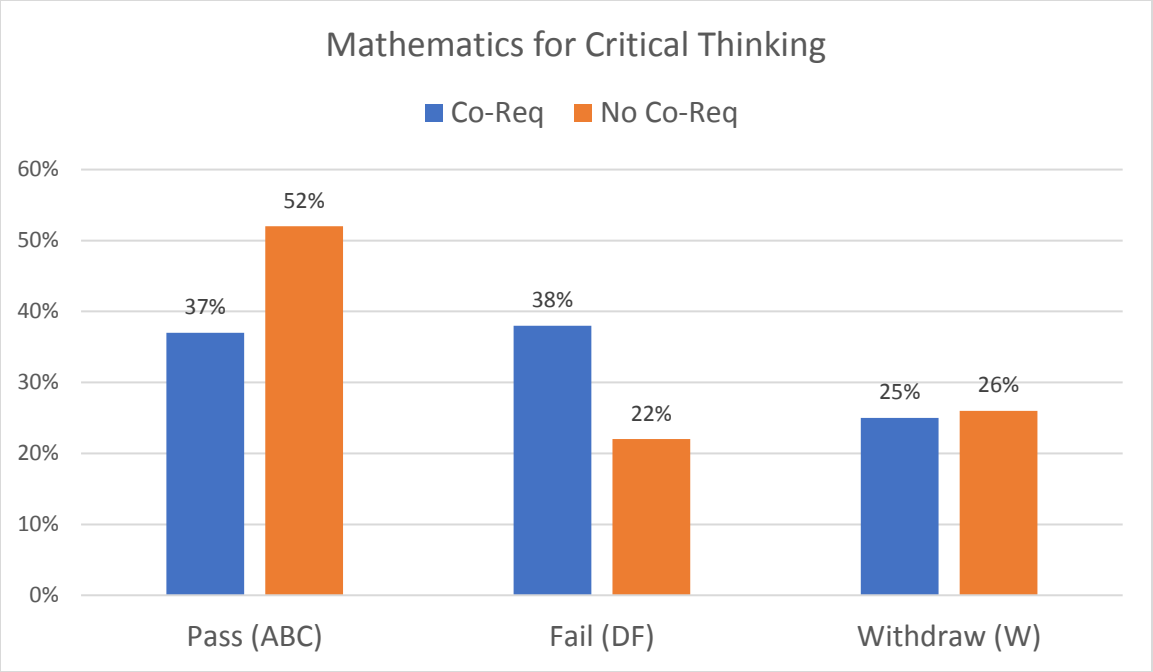
Mathematics for Critical Thinking: Comparison of Co-Requisite vs. Non Co-Requisite Groups

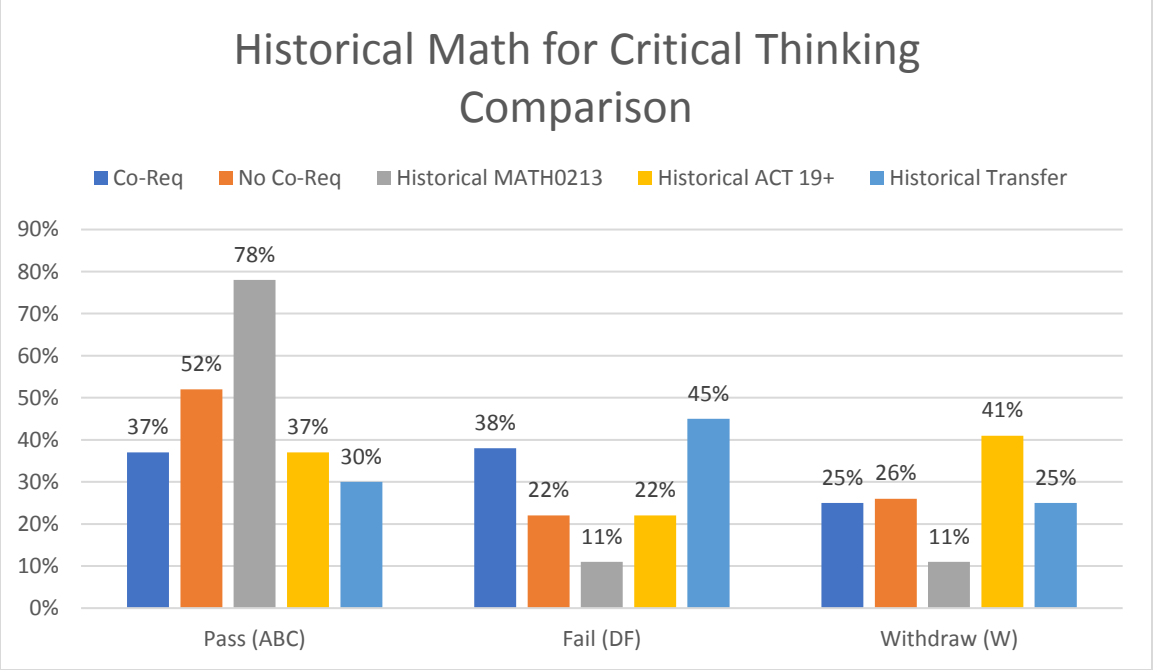
		Co-Requisite Math for Critical Thinking Group		Total
		Co-Req for CT	No Co-Req for CT	
Math for Critical Thinking	FAIL	28	31	59
	WITHDRAW	18	36	54
	PASS	27	73	100
Total		73	140	213

Note: Percent may not sum to exactly 100.0% due to rounding.

Compared to previous 3-year moving average: 77.7% Success Rate for MATH 1503 after MATH 0213 Intermediate Algebra (No data for MATH 0114 Elementary Algebra Plus). Historical Population size for MATH 1503 = 14.

Significantly lower success rate (95% CL) in MATH 1503 resulted for 73 students compared to 14 students in previous three-year period prior to implementation of the CCA initiative. Five developmental math students passed MATH 1503 in three years compared to 27 Co-Req students passing in 2017-2018.





Note: N=14 for Historical MATH 0213.

Note: Displayed are N=1 student enrolled in MATH 0114, who subsequently (unsuccessfully) enrolled in MATH 1503 in historical 3-year average. Only two students waived the developmental math requirements with a Compass score and subsequently (successfully) completed MATH 1503 in the historical 3-year comparative period.

Math for Critical Thinking Foundations (MATH 0312) Prediction of Success in Math for Critical Thinking MATH 1503)

	Did Not Pass MATH 1503	*Passed MATH 1503*
Passed MATH 0312	False Positives 21.9%	True Positives 35.6%
Did Not Pass MATH 0312	True Negatives 41.1%	False Negatives 1.4%

RQ3. Does ACT affect co-requisite math success?

Mathematics for Critical Thinking
For 73 students who enrolled in MATH0312

ACT MATH * MATH1503successforLogisticRegression Crosstabulation				
		MATH1503successforLogisticRegression		Total
		Did Not Pass MATH 1503	Passed MATH 1503	
ACT MATH	2	1	0	1
	13	2	2	4
	14	3	0	3
	15	9	5	14
	16	27	9	36
	17	16	12	28
	18	18	15	33
	19	4	8	12

	20	5	5	10
	21	3	8	11
	22	1	13	14
	23	1	3	4
	24	2	4	6
	25	6	2	8
	26	2	0	2
	27	0	1	1
	28	0	1	1
	29	0	1	1
Total		100	89	189

Note: Percent may not sum to exactly 100.0% due to rounding.

Saddle Point at ACT Math = 19

RQ4. Did students enrolled in co-requisite math courses persist at the same rates as other students?

Mathematics for Critical Thinking

Enrolled FA2018 * MATH1503successforLogisticRegression Crosstabulation				
		MATH1503successforLogisticRegression		Total
		Did Not Pass MATH1503	Passed MATH1503	
Enrolled FA2018	Did Not Enroll in Fall 2018	31 (67.4%)	6 (22.2%)	37
	Enrolled Fall 2018	15 (32.6%)	21 (77.8%)	36
Total		46 (100%)	27 (100%)	73

Note: Percent may not sum to exactly 100.0% due to rounding.

Mean fall-to-fall retention rate for Fall 2017 FTFT bachelor degree-seeking freshmen was 74%. MATH 1503 retention includes part-time and full-time as well as associate and bachelor degree-seeking students.

This means that a majority (67%) of co-requisite Mathematics for Critical Thinking Foundations students who did not pass Mathematics for Critical Thinking in 2017-2018 did not re-enroll during Fall 2018. Comparatively, 78% of co-requisite Foundations students who did pass Mathematics for Critical Thinking in 2017-2018 persisted into fall 2018.

ENGLISH

In order to assess student learning outcomes, the following research questions were asked.

1. What were the success rates in co-requisite Composition I Supplement and Composition I?
2. Were students, who enrolled in the co-requisite Supplement course, as successful in college-level Composition I as those who did not enroll in the co-requisite Supplement course?
    a. If not, were they as successful as students enrolled in the historical, traditional developmental writing course?
3. Does ACT affect co-requisite English/writing success? Does high school GPA predict success?
4. Did students enrolled in the co-requisite English/writing course persist at the same rates as other students?

Results of implementation of this initiative for Year 1 are as follows:

- Students who enrolled in Composition I Supplement had a *similar* success rate in Composition I as students who:
    - Scored lower than 19 on the ACT English subtest but waived the co-requisite with a qualifying score on the Accuplacer
- Students who enrolled in Composition I Supplement had a *higher* success rate in Composition I than students who:
    - Transferred in their developmental writing course from another institution
        - 2% difference in success rate
- Students who enrolled in Composition I Supplement had a *lower* success rate in Composition I than students who:
    - Scored 19 or higher on the ACT ENGL subtest
    - Historically (2016-2017) completed Basic Writing ENGL 0003 prior to Composition I ENGL 1113
        - 6% difference in success rate
- Although the success rate in Composition I for Basic Writing students was 6% higher than for co-requisite Supplement students, a significantly higher <u>number</u> of co-requisite

Supplement students (N = 127) enrolled and subsequently completed Composition I than did Basic Writing in the previous cohort (N = 63).
    - This may be due to writing anxiety among Basic Writing students, causing them to delay enrollment in the gateway Composition I course.
- Students who enrolled in Composition I Supplement had a *higher* success rate in Composition II than students who:
    - Scored lower than 19 on the ACT English subtest but waived the co-requisite with a qualifying score on the Accuplacer
- Students who enrolled in Composition I Supplement had a *lower* to *slightly lower* success rate in Composition I than students who:
    - Scored 19 or higher on the ACT ENGL subtest
        - 7% difference in success rate
    - Historically (2016-2017) completed Basic Writing ENGL 0003 prior to Composition I ENGL 1113
        - 4% difference in success rate
    - Transferred in their developmental writing course from another institution
        - 4% difference in success rate
- Notwithstanding the difference in success rates in Composition II, co-requisite students in 2017-2018 successfully completed Composition II in greater numbers within the same academic year than all comparison groups except the students with ACT ENGL subtest scores of 19 or higher.
- In the Year 1 co-requisite Supplement group, ACT score on the ENGL subtest did not predict success in Composition I, nor did high school GPA.
- 72.4% of co-requisite students who successfully completed ENGL 1113 re-enrolled in fall 2018, whereas 18.3% of co-requisite students who did not successfully complete ENGL 1113 their first year re-enrolled in fall 2018.
    - Mean fall-to-fall retention rate for Fall 2017 FTFT bachelor degree-seeking freshmen was 74%. The co-requisite

student retention includes part-time and full-time as well as associate and bachelor degree-seeking students.

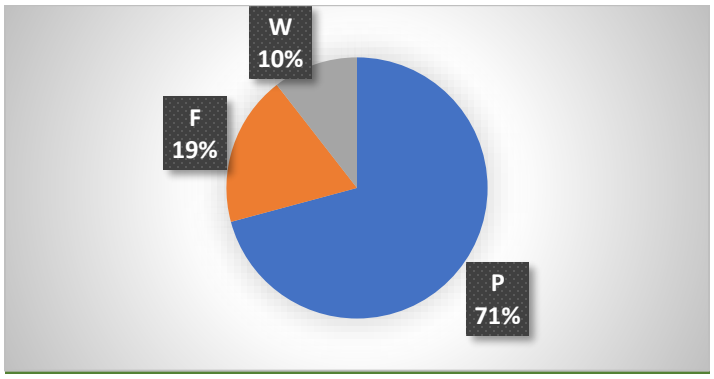
- This suggests that completion of Composition I is a strong indicator of student persistence. It further suggests that co-requisite education in Composition I is related to student success.

2017-2018 Co-requisite ENGL 0111 Composition I Supplement

	Frequency	Percent
P	148	70.8%
F	39	18.7%
W	22	10.5%
Total	209	100%

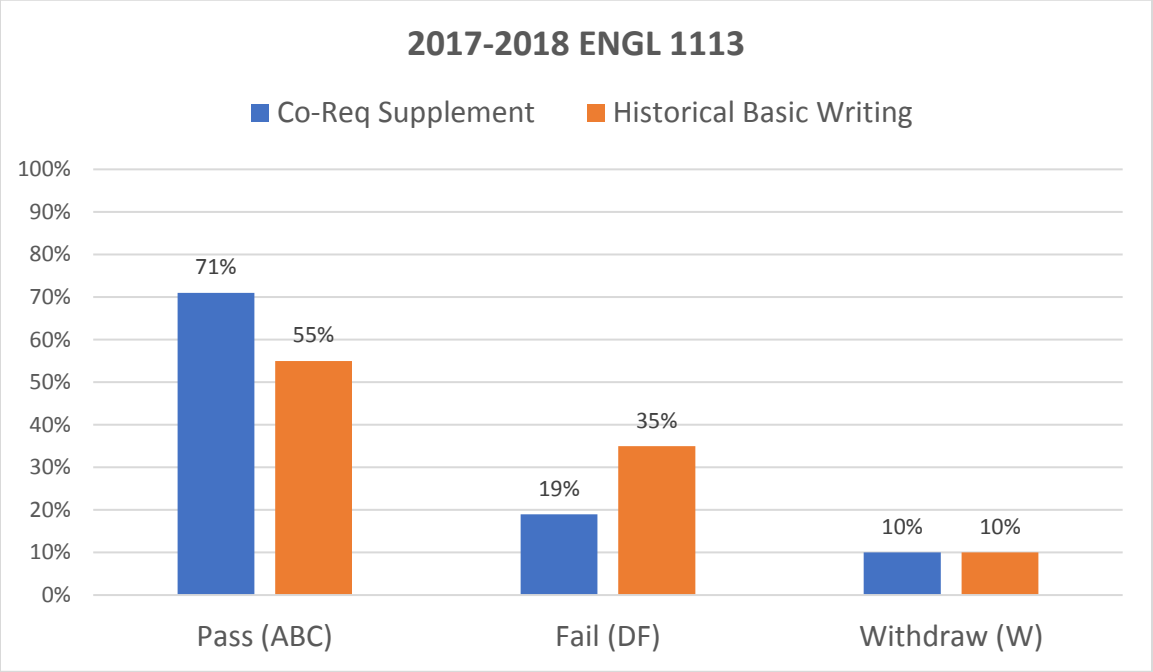
Note: Percent may not sum to exactly 100.0% due to rounding.

2017-2018 Co-requisite ENGL 0111 Composition I Supplement



Note: 2016-2017 Basic Writing pass/success rate (ABC): 55.4% compared to 70.8% 2017-2018 Supplement pass/success rate (ABC).

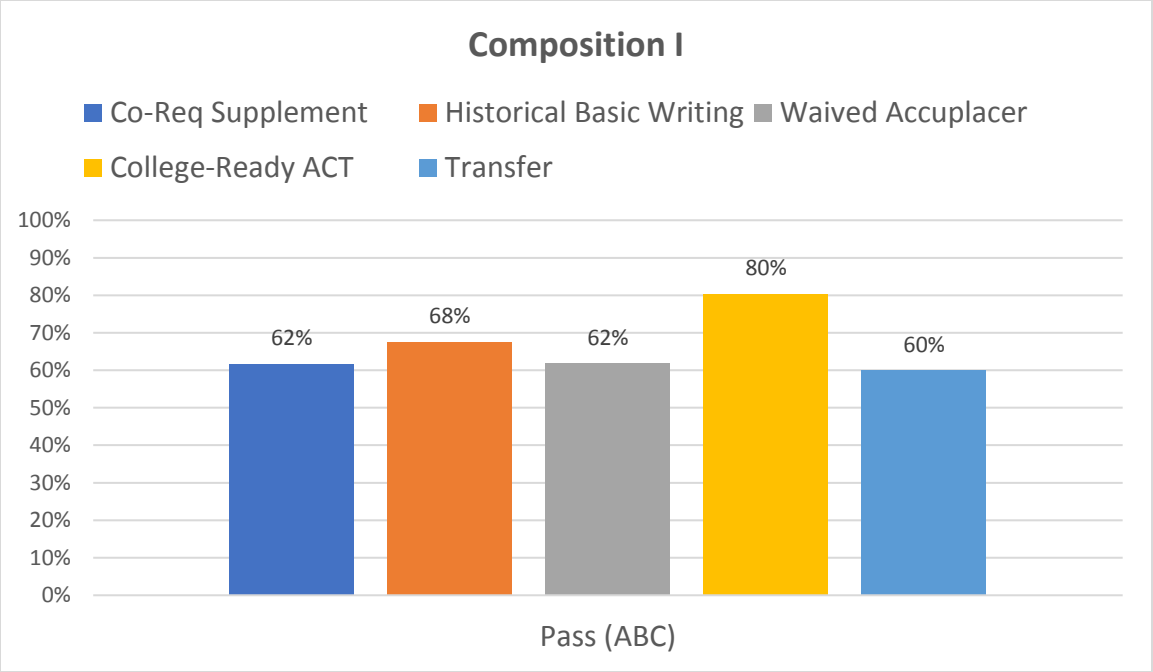
2017-2018 Co-requisite ENGL 0111 Composition I Supplement Compared with 2016-2017 Basic Writing



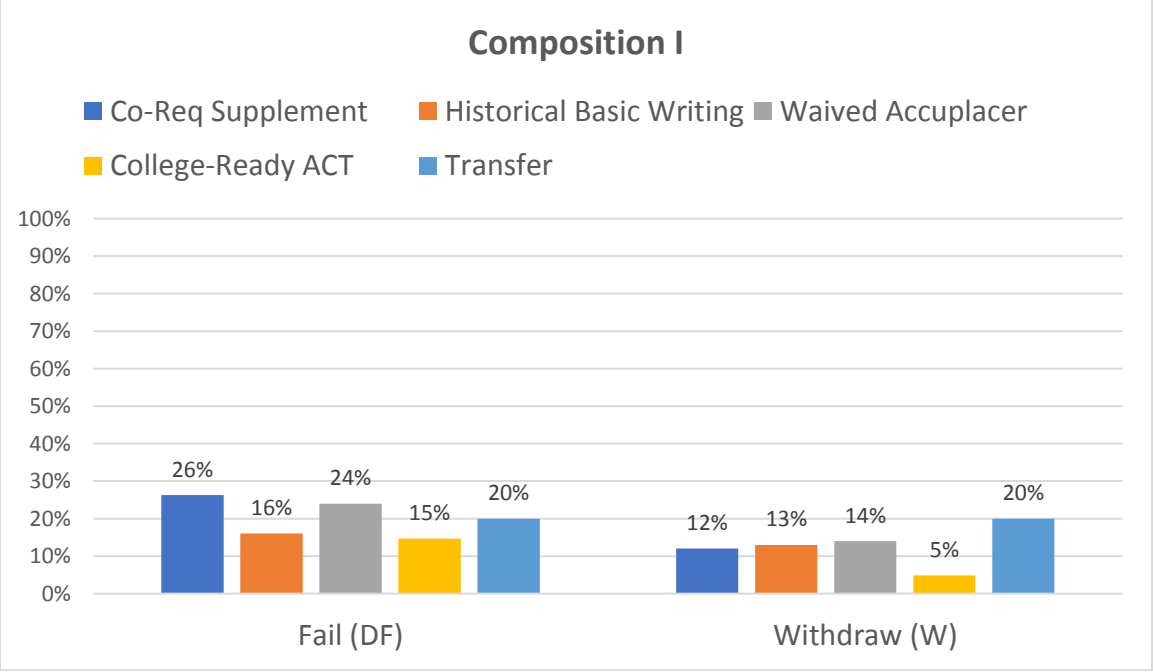
2017-2018 Co-Requisite vs. College-level Success in ENGL 1113 Composition I

ENGL 1113 Composition I * Co-requisite/Developmental Status Cross-tabulation				
		Co-requisite/Developmental Status		Total
		Co-Requisite	Not Co-Requisite	
	A	33	290	323
	B	57	212	269
	C	39	89	128
	D	11	31	42
	F	42	76	118
	I	2	1	3
	W	25	36	61
Total		209	735	944

ENGL 1113 Composition I Success Rate by Group



ENGL 1113 Composition I Non-Success Rates by Group

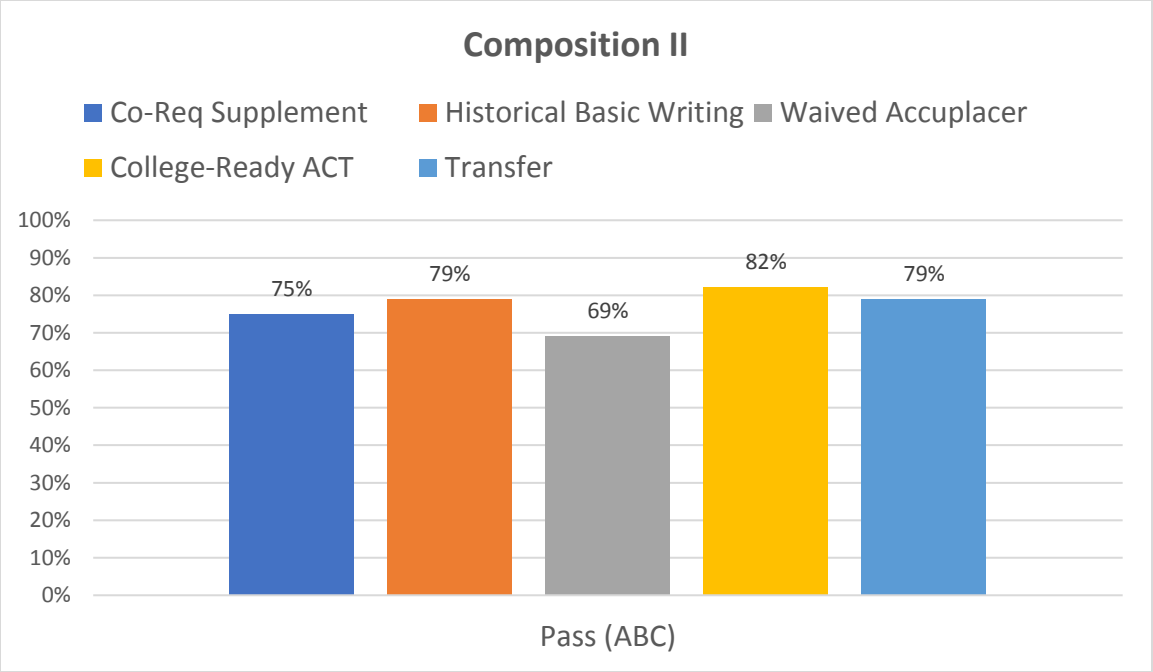


- In 2017-2018, 159 ENGL 0111 Supplemental students successfully completed ENGL 1113 Composition I (ABC).
- In 2016-2017, 63 ENGL 0003 Basic Writing students successfully completed ENGL 1113 Composition I (ABC).

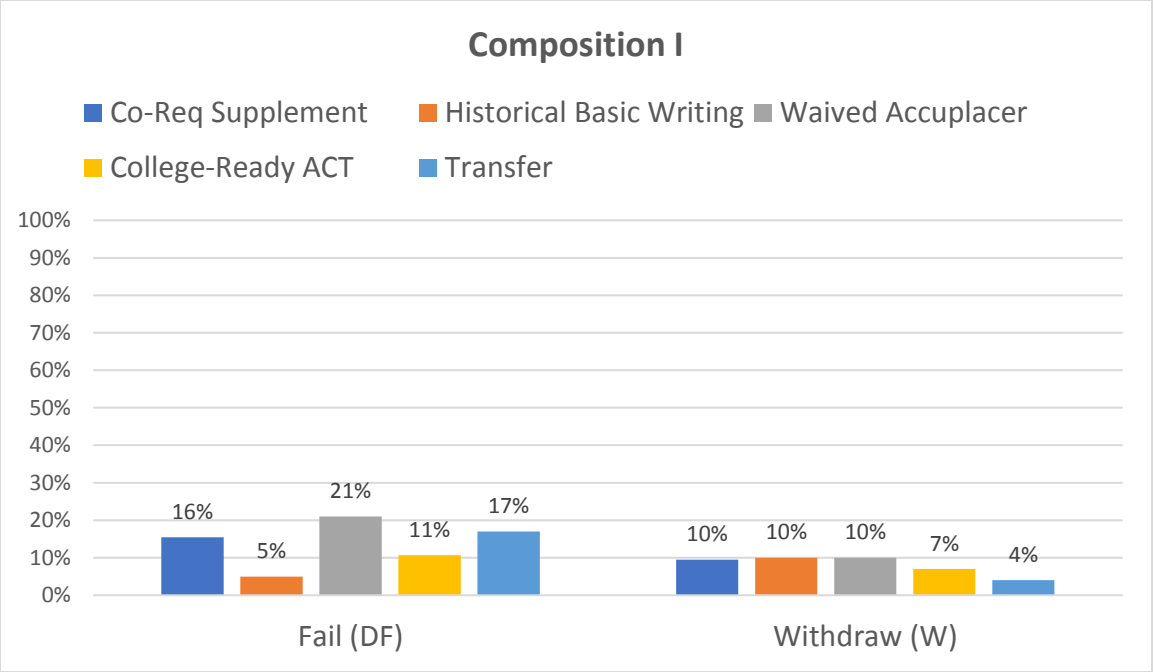
2017-2018 Co-Requisite vs. College-level Success in ENGL 1213 Composition II

ENGL 1213 Composition II * Co-requsite/Developmental Status Crosstabulation				
		Co-requsite/Developmental Status		Total
		Co-Requisite	Not Co-Requisite	
ENGL 1213 Composition II				
	A	12	305	317
	B	27	176	203
	C	24	93	117
	D	4	28	32
	F	8	46	54
	I	1	1	2
	W	8	49	57
Total		209		

ENGL 1213 Composition II Success Rates by Group



ENGL 1213 Composition II Non-Success Rates by Group



Composition I Supplement (ENGL 0111) Prediction of Success in Composition I (ENGL 1113)

	Did Not Pass ENGL 1113	*Passed ENGL 1113*
Passed ENGL 0111	False Positives 10.5%	True Positives 60.3%
Did Not Pass ENGL 0111	True Negatives 27.8%	False Negatives 1.4%

RQ3. Does ACT affect co-requisite ENGLISH 1113 success?

ACT ENGL Sub-test Scores by ENGL 1113 Composition I Success for For 209 students who enrolled in MATH0312

ACT ENGLISH * Successful in ENGL 1113 (with ABC) Cross-tabulation

	Successful in ENGL 113 with ABC	
	No	Yes

Total

ACT ENGLISH	8	1	2	3
	9	2	5	7
	10	4	6	10
	11	6	12	18
	12	8	5	13
	13	10	7	17
	14	10	11	21
	15	16	27	43
	16	5	20	25
	17	15	6	21
	18	3	15	18
	19	1	2	3
	20	0	1	1
	21	1	0	1
Total		82	119	201

Note: 8 students did not have ACT scores in EX for ENGL Subtest

- Students, who enrolled in ENGL 0111 Composition I Supplemental, with ACT ENGL subtest scores of 14, 15, 16, 18 and 19 were more were more likely than not to be successful in ENGL 1113
- Students, who enrolled in ENGL 0111 Composition I Supplemental, with ACT ENGL subtest scores of below 14 were also generally more were more likely than not to be successful in ENGL 1113

RQ3.B Does high school GPA predict success in ENGL 1113 for co-requisite students?

Correlation		
	GPA	Numerical ENGL 1113 Grade

GPA	Pearson Correlation	1	.085
	Sig. (2-tailed)		.253
	N	183	183
Numerical ENGL 1113 Grade	Pearson Correlation	.085	1
	Sig. (2-tailed)	.253	
	N	183	209

- High school GPA is unrelated to success in ENGL 1113 for the 2017-2018 co-requisite group.

RQ4. Did students enrolled in co-requisite English 0111 Composition I Supplement persist at the same rates as other students?

EnrolledFA2018num * Successful in ENGL 1113 with ABC Cross-tabulation				
		Successful in ENGL 1113 (with ABC)		Total
		No	Yes	
Re-enrolled in Fall 2018	No	67 (81.7%)	35 (27.6%)	102
	Yes	15 (18.3%)	92 (72.4%)	107
Total		82 (100%)	127 (100%)	209

- 72.4% of co-requisite students who successfully completed ENGL 1113 re-enrolled in fall 2018, whereas 18.3% of co-requisite students who did not successfully complete ENGL 1113 their first year re-enrolled in fall 2018.
- Mean fall-to-fall retention rate for Fall 2017 FTFT bachelor degree-seeking freshmen was 74%. The co-requisite student retention

includes part-time and full-time as well as associate and bachelor degree-seeking students.

- This means that a strong majority (81.7%) of co-requisite ENGL 0111 students who did not pass Composition I in 2017-2018 did not re-enroll during Fall 2018.