An analysis of Co-requisite Instructional Strategies

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The state's 26 public universities and colleges comprise the University System of Georgia (USG), and these institutions represent a student population of more than 340,000. Ranging from open access institutions to highly selective research universities, the USG has completed a three-year transition to the co-requisite model of developmental education in both English and mathematics impacting more than 26,000 student course enrollments. Compared to results from previously used developmental models, the co-requisite approach doubled success rates in freshman mathematics while increasing by 50 percent the success rates in freshman writing. These improvements held true for students at every preparation level and in every demographic segment. In implementing this scaling effort, while there was an overall design structure which all institutions used, there was also considerable flexibility about the use of instructors, the composition of the classes and the numbers of credit hours required. This technical brief will present the results of a detailed analysis of these approaches, making clear which combinations of strategies prove most and least beneficial in co-requisite English and in mathematics.

Scaling the Co-requisite Model

In Fall 2017, the University System of Georgia (USG) began a detailed analysis of the data comparing the effectiveness of three approaches to developmental education that were being used across the system in both English and mathematics. The three approaches were: a traditional developmental sequence; the *Foundations* model, in which students enroll in a single semester of remediation requiring successful completion prior to enrolling in a college-level course; and the *co-requisite* model. To compare the effectiveness of these approaches we compared the rates at which students were able to successfully complete a college-level English course and a college-level mathematics course (college algebra, quantitative reasoning, or math modeling) within one academic year.

The results (see Denley 2021) were striking and mirrored results of a similar analysis from the Tennessee Board of Regents (see Denley 2015). The students who were educated using the co-requisite model were more than twice as likely to complete a college level mathematics class with a grade of "C" or better when compared with their peers who used either of the other two pre-requisite approaches. Indeed, while the success rates more than doubled overall, the gains were not only for the most prepared students. In fact, the largest gains in success rates were experienced by students with the weakest preparation. The data for the other measures of preparation were similarly compelling.

The analysis for gateway English course success followed a very similar pattern. Once again, the students who were educated using the co-requisite model were almost twice as likely to earn at least a "C" grade in their college-level English class when compared with their peers who used either of the other two pre-requisite approaches. As with mathematics, the gains in success rates were apparent all across the preparation spectrum, producing very similar success rates, regardless of incoming high-school preparation.

While the improvement in the results for the overall student population were impressive, so, too, was the co-requisite model's effectiveness in improving success rates for all student sub-populations and in eliminating equity gaps. As with mathematics, the gains in success rates were apparent all across the preparation spectrum, producing very similar success rates, regardless of incoming high-school preparation. The data for the other measures of preparation were similarly compelling.

In light of these results, all 26 University System of Georgia universities and colleges moved entirely to the co-requisite model of development education for college mathematics and English beginning Fall 2018.

Since full implementation, USG has carefully monitored and analyzed the outcome data for the more than 25,000 students involved in developmental education in the academic years 2018 and 2019. The success results for the full scale implementation have closely mirrored those that were seen in the earlier analysis. In mathematics, the success rate exceeded the overall co-requisite success rate in the previous three years, and more than doubled the best outcomes from either of the other previous two approaches. English saw similar performance. The overall success outcome showed the expected substantial increase over either of the other two approaches. A full analysis of these results is given in a USG technical report (see Denley 2021)

Co-requisite Model and Implementation Strategies

While there are a variety of ways to implement the co-requisite model, USG chose a scaling approach that followed three design principles:

- All students enroll directly into a college-level mathematics or English course that satisfies a general education requirement.
- Co-requisite students are required to also attend a 1-3 credit hour *co-requisite* course that is aligned with, and offered alongside, the appropriate college-level course.
- The *co-requisite* course is designed specifically to help students master the skills and knowledge required for success in the accompanying college-level course.

Within these design parameters, institutions were free to make decisions concerning how many credit hours comprised the co-requisite class, the composition of the student body in the credit-bearing class, and whether the same instructor or different instructors taught the two instructional experiences.

During the growth of co-requisite as a developmental education model, there has been considerable interest in understanding which of these more granular models are more beneficial to student outcomes. By analyzing the full implementation for academic years 2018-19 and 2019-20, we have been able to shed some light on which combinations of strategies produce better results. That analysis will be the focus of this technical report.

The strategies that we examined were:

- Same instructor for both credit and co-requisite class *vs* different instructors
- All co-requisite students in the credit bearing class *vs* both co-requisite and non-co-requisite students together
- 1, 2, or 3 hours of co-requisite instruction

Using student record data, in combination with course scheduling data we were able to identify which combination of strategies each student experienced in their co-requisite English or mathematics class in Fall 2019.

In carrying out the analysis, to account for differing underlying distributions of preparation level for the 12 combinations of strategies, we further disaggregated the data by preparation, concording SAT sub-scores to ACT sub-scores to obtain a preparation level for each student

whenever available. In this way we were able to calculate an average success rate, by preparation level regardless of combinations of strategy for both English and mathematics. These overall average success rates together with the numbers of students with each level of preparation are show in the tables below. These success rates are for student success in only the Fall 2019 semester.

ACT Math Subscore	No Score	<14	14	15	16	17	18	19	20	21	Total
Pass Rate	57.5%	53.9%	52.2%	54.1%	60.1%	56.5%	61.1%	61.5%	61.8%	62.3%	58.8%
N	3591	103	415	636	980	631	753	674	496	410	9309

ACT English Subscore	No Score	<14	14	15	16	17	18	19	20	Total
Pass Rate	65.4%	69.2%	69.2%	73.5%	69.7%	55.1%	60.5%	62.4%	69.4%	63.2%
N	1404	430	184	222	189	89	243	247	234	3460

Since the underlying preparation distributions of the students who were educated using the 12 different combinations of strategies vary, in evaluating the effectiveness of the strategy combinations we did not merely compare their average success rates, but instead compared those success rates to their expected success rates based on the overall success distribution and the preparation distribution of the students that experienced that combination. With this methodology we were assured of identifying the strategy combinations that best served students across the preparation spectrum rather than favoring a strategy combination that produced better results simply because the students involved were better prepared. It is worth noting that these data are based on student level record designations. Consequently students at the same institution, or even in the same class section, might be designated in differing strategy combinations depending on precisely which of the 12 combinations they individually experienced. The following table provides the analysis of those of the 12 strategy combinations that affected at least 25 students.

English Courses			N	Observed - Expected
Only Coreq student class	Same Instructor	1 Coreq hour	899	2.9%*
		2 Coreq hours	366	8.5%***
		3 Coreq hours	215	2.6%
Combined student class	Different Instructor	1 Coreq hour	748	-7.9%***
		3 Coreq hours	42	-3.7%
Combined student class	Same Instructor	1 Coreq hour	746	-2.7%
		3 Coreq hours	404	2.5%
Mathematics Courses			**N**	**Observed - Expected**
Only Coreq student class	Different Instructor	1 Coreq hour	42	-24.3%***
		2 Coreq hours	431	-8%***
Only Coreq student class	Same Instructor	1 Coreq hour	1269	-12.3%***
		2 Coreq hours	1278	0.7%
		3 Coreq hours	883	6.6%***
Combined student class	Different Instructor	1 Coreq hour	333	-1.3%
		2 Coreq hours	1346	4%***
		3 Coreq hours	111	10.3%**
Combined student class	Same Instructor	1 Coreq hour	1442	-3.4%***
		2 Coreq hours	1850	6.8%***
		3 Coreq hours	324	-1.2%

* = significant at 90% level
** = significant at 95% level
*** = significant at 99% level

To summarize the findings:

In English we can say with strong statistical significance that students are most benefitted by a course structure in which the students have the same instructor for both their credit-bearing and co-requisite classes, the credit-bearing course has only co-requisite students, and the co-requisite class is 2 credit hours. We can also say with strong statistical significance that students are least benefitted by having different instructors for their credit bearing and co-requisite classes, being in a mixed credit-bearing class of both co-requisite and non-co-requisite students, and with a 1 credit-hour co-requisite course.

When we further disaggregated the data set to compare the strategy combination effects on different racial groups we saw similar findings, with the addition that Hispanic/Latino students are also well served by a course with the same instructor, mixed class and 3 credit hour co-requisite class.

In mathematics we can say with strong statical significance that students are least well served by strategy combinations that involve only 1 credit hour co-requisite classes. When we further disaggregated by race we saw strong statistical significance for Black and Latino students being better served by strategy combinations that involve using the same instructor with at least 2 credit hours of co-requisite.

References

1. Denley, T., (2015a) Co-requisite Remediation Pilot Study, Tennessee Board of Regents Technical Brief No.1
2. Denley, T., (2015b) Co-requisite Full Implementation, Tennessee Board of Regents Technical Brief No.3
3. Denley, T., (2021) Scaling Co-requisite Developmental Education, University System of Georgia Academic Affairs Technical Brief No.1
4. Remediation Higher Education's Bridge to Nowhere, Complete College America (2012)
5. National Academies of Sciences, Engineering, and Medicine. 2019. Increasing Student Success in Developmental Mathematics: Proceedings of a Workshop. Washington, DC: The National Academies Press. https://doi.org/10.17226/25547

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