Georgia Journal of College Student Affairs

Volume 35 | Issue 1 Article 3

2019

Relationship between Required Corequisite Learning and Success in College Algebra

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This study sought to answer if a relationship existed between required corequisite support and success in gateway College Algebra courses. Complete College America and Complete College Georgia initiatives over the last ten years have sought ways to increase access to higher education with high progression and completion rates. Efforts such as the Momentum Year in University System of Georgia schools utilize developmental corequisite courses for gateway English and Mathematics to ensure early success and progression. This study used a chi-square test to analyze two groups of new freshmen and their success in College Algebra—one group who participated in corequisite learning (n=55) and one group who did not participate in corequisite learning (n=158), finding that a higher proportion of students succeed in College Algebra when also enrolled in corequisite support.

Smith, A. (2019). Relationship between required corequisite learning and success in college algebra. *Georgia Journal of College Student Affairs, 35*(1), 23-44.

ISSN: 2330-7269

In 2009, Complete College America (CCA) was developed as a nonprofit organization to focus on increasing access to higher education and degree completion in the United States (Complete College America, n.d.). CCA has six main strategies to help students succeed in earning a post-secondary credential: 15 to Finish, Math Pathways, Corequisite Support, Momentum Year, Academic Maps with Proactive Advising, and A Better Deal for Returning Adults (Complete College America, n.d.). These strategies are also part of Complete College Georgia (CCG), the state-level program stemming from CCA with the same goals, established in 2011 and now administered by the University System of Georgia (USG) (University System of Georgia, n.d.). Degree completion rates in Georgia are far below the national average, according to the National Center for Higher Education Management Systems (2018). The Center reported a six-year graduation rate for the fall 2009 cohort pursuing a bachelor's degree of 38.7% whereas the national rate is 53.8%. In late 2017, the USG began implementation of the Momentum Year, one of the original CCA tenets, as a mandatory initiative for all USG institutions. Momentum Year, both at the national CCA level and in the state CCG level, incorporates many of the main CCA tenets, but is focused solely on the freshman year of college to give new students a strong starting point to propel them through their degrees (Complete College America, n.d.; University System of Georgia, n.d.). Efforts include the use of academic focus areas with specific program maps, taking a fuller schedule, and pushing an academic mindset (University System of Georgia, 2016).

One key performance indicator in successful progression toward a degree—one that is also central to the USG and CCG Momentum Year plan and overall CCA initiatives—is completion of the appropriate gateway (entry-level) math course (Calcagno, Crosta, Bailey & Jenkins, 2007; Denley, 2016; Leinbach & Jenkins, 2008). Corequisite learning, widely discussed in CCA and CCG literature, has been found to facilitate success in gateway courses, including College Algebra (Berryman & Short, 2010; Brower et al., 2017; Denley, 2016; Logue & Watanabe-Rose, 2014; Mireles, Acee, and Gerber, 2014; Royer & Baker, 2018). This instructional model is proposed as a way to increase gateway success through participation in the college-level course alongside a concurrent course using the concept of "just-in-time academic support" (Complete College America, 2019), with remediation and support occurring in real time with gateway course learning. Additionally, corequisite learning can decrease time and cost to degree (Belfield, Jenkins, & Lahr, 2016; Mireles et al., 2014). The USG

DOI: 10.20429/gcpa.2019.350103

has included this model in the Momentum Year with required corequisite support in gateway English and mathematics for students meeting certain criteria including low high school grade point averages (GPA) and college entrance exam scores. The criteria developed for mathematics differ based on the course; College Algebra has a higher exemption threshold, meaning students must have higher GPAs or test scores if they are starting a math sequence with College Algebra (University System of Georgia, n.d.). As of fall 2018, corequisite support is the only learning support option for students, with absolute discontinuation of prerequisite, or foundation, support.

While there is a wide range of research on corequisite learning and success in mathematics, the learning support requirements by the USG were new for the 2018-19 academic year. The purpose and significance of this comparison study was to inform the use of corequisite support for College Algebra and the overall learning support policy of the USG. This quantitative study compared College Algebra grades between two groups of freshmen—one group enrolled in corequisite support and the other group not enrolled in corequisite support—to discern if a relationship existed between required corequisite support and success in gateway College Algebra courses.

LITERATURE REVIEW

The Momentum Year initiative is "a suite of strategies" that lead students "on a path to achieve their educational goals, including successful degree completion and on-time graduation" (University System of Georgia, 2016, para. 1). Corequisite learning policies enacted by the University System of Georgia as part of the Momentum Year are based on evolving theory and research on college persistence, retention, and graduation at institutions across the United States. The use of corequisite learning as a strategy to increase degree completion can be traced through a review of the literature, looking at completion initiatives, gateway course success measures, and developmental learning practices. While still a fairly recent construct in education success theory, corequisite learning was designed out of a desire to find the best student-centered path to achievement.

College Retention and Graduation

Complete College America (CCA) was developed to address achievement gaps in the growing population enrolled in higher education, noting that undergraduate degree completion rates had not increased in almost 40 years (Complete College America, n.d.). At the time of CCA's creation, the national six-year graduation rate for a bachelor's degree

was 55.5%; the national three-year graduation rate for an associate's degree was 29.2% (The National Center for Higher Education Management Systems, 2018). In the time since, rates have not increased much. Shapiro et al. (2017) reported that students who began a degree program at a college or university during the fall of 2011 have a 56.9% six-year degree attainment rate. Additionally, they found variations in completion rates by student type, race and ethnicity, and institution type.

Research showing disparities based on student demographics are plentiful. Race was found to be a powerful predictor in completion with Whites graduating at much higher rates than Blacks, Hispanics, and other minorities (Arcidiacono & Koedel, 2014; Contreras & Contreras, 2015; Fletcher & Tienda, 2010; Tracey & Sedlacek, 1987). Socioeconomic status also played a factor (Castleman & Long, 2016; Goldrick-Rab, Kelchen, Harris & Benson, 2016; Witkow, Huynh & Fuligni, 2015), along with first-generation status (Petty, 2014; Stephens & Hamedani, 2014). Perhaps the top indicator is college preparation, defined as the combination of high school grade point average and college entrance exam scores (Daugherty & Lane, 1999; Pike, Hansen & Childress, 2014).

Aside from student factors that show a predisposition for completion, student success initiatives coordinated by the college or university showed to greatly affect graduation rates. Millea, Wills, Elder, and Molina (2018) pointed out the importance of scholarships and small class sizes. Social integration was noted as a key factor (Daugherty & Lane, 1999), along with determination and grit (Martin, Galentino & Townsend, 2014). However, CCA and CCG initiatives look beyond racial, social, and even incoming academic preparation factors to provide key institutional strategies that move students along their academic path, wherever they begin. CCA and CCG recognize the imbalance by these demographic factors but have developed scalable efforts that work for all students (Complete College America, n.d.). One key piece of these progression plans by CCA and CCG is early student completion of required college-level math and English courses.

Gateway Course Completion

Nearly all core curriculums for associate and bachelor degree programs include at least one entry-level English composition course and one mathematics course, most of which are taken in the first year of college work. Denley's (2016) research in Tennessee showed that students who failed to complete these gateway courses were less likely to

DOI: 10.20429/gcpa.2019.350103

persist and graduate. Denley (2016) reported that community college students who did not pass all three gateway courses in their first year (English Composition I, English Composition II, and general education math) had an 18% six-year graduation rate. Conversely, those who did pass the courses had a 48% graduation rate. Because the completion of these courses can have such an impact on persistence, instructional methods to aid in pass rates are highly sought. Developmental, or remedial, education is the approach most post-secondary institutions use to assist students in mastering the necessary skills to successfully complete gateway English and mathematic courses.

Determining the Need for Developmental Learning

The role of developmental learning is to ensure that academically underprepared students can be successful in college-level course work. Logue (2018) reported that 68% of public community college freshmen and 40% of public four-year college freshmen enroll in at least one developmental course. However, the process of developmental learning has become a method of quality control that weeds out students who cannot complete the remedial work (Attewell, Lavin, Domina, & Levey, 2006). Students are selected for participation most often based on high school performance, college entrance exam scores, college placement exam scores, length of time out of the classroom, or even self-selection. A mix of all indicators is considered best practice (Edgecombe & Bickerstaff, 2018; Rutschow & Mayer, 2018; Scott-Clayton, 2012; Woods, Park, Hu & Jones, 2018).

Placement exams are commonly used to assess students for remedial work, evaluating skill levels prior to beginning courses. However, California is moving to rely more on high school work and college entrance exams to decrease the number of students in remedial coursework while also placing them directly into college-level work (Smith, 2017). The University System of Georgia has moved to the exemption method, assuming all students should take a developmental course unless they meet one of many options that include a minimum high school GPA, college entrance exam score, or placement exam score (University System of Georgia, n.d.). Conversely, Attewell et al. (2006) found that placement into developmental coursework was rather arbitrary and varied greatly by institution and institution type.

Developmental Learning Support

The traditional definition of remedial or developmental education refers to prerequisite

courses taken in advance of the gateway course, designed to help an underprepared student learn the skills needed for success in the college-level course. Studies to determine value in remedial education have nearly always been flawed and mixed results have been reported (Bettinger & Long, 2009; Rodriguez, Johnson, Mejia & Brooks, 2017). Recent studies showed that highly underprepared students who take remedial prerequisites have stronger degree completion rates than students who do not take the courses (Bettinger & Long, 2009; Boatman & Long, 2018). However, students on the cusp of being considered college-ready were found to have less success through remediation (Boatman & Long, 2018).

While most colleges and universities are non-selective or open access, there has been a decrease in developmental education offerings over the past 20 years (Attewell et al., 2006; Bahr, 2010; Fair, 2017). This decrease can be attributed to the aforementioned mixed findings from research, increase in time to degree completion, cost to the student, low pass rates, and low persistence rates (Berryman & Short, 2010; Bettinger & Long, 2009; Smith, 2017). Poor pass rates and persistence to the next level seem to be the most influential factors in the discontinuation of developmental education and the call for reformation (Clotfelter, Ladd, Muschkin & Vigdor, 2015; Complete College America, 2012; Denley, 2016).

With all the controversy surrounding remediation, revised methods have been tested, including accelerated/compressed remediation, modular courses, contextualized experiences, and corequisite learning (Brower et al., 2017; Saxon & Martirosyan, 2017). Research on these areas is burgeoning, but early studies showed positive results. Lucas and McCormick (2007) saw results indicating success at Middle Tennessee State University as the Tennessee Board of Regents pioneered the redesign of developmental learning. More recently, Park, Woods, Hu, Jones, and Tandberg (2018) found that students who self-select into accelerated developmental math courses had the highest subsequent pass rate in their gateway math (over those with no development education or corequisite support). Corequisite learning has garnered the most attention, though, with most developmental models morphing into this pedagogy.

Corequisite Learning

Research on the corequisite model of developmental learning increased in the last two to three years and has become the hallmark of CCA initiatives (Complete College America, 2019) and CCG's Momentum Year initiatives (University System of Georgia, n.d.).

DOI: 10.20429/gcpa.2019.350103

One of the primary goals of CCG and the USG is to increase the successful completion of gateway courses early in a student's academic career through concurrent enrollment in a support class and the college-level course associated with this support class (University System of Georgia, n.d.). Berryman and Short (2010) wrote that Austin Peay State University was one of the first to develop just-in-time learning when Tennessee overhauled all developmental learning, creating Supplemental Learning Assistance with support sections of college courses. Fair's (2017) dissertation asserted that students taking corequisites alongside their math course passed at the same rate as those exempted from developmental/learning support for the same gateway math course. Additional research published by Brower et al. (2017), Complete College America (2012), Denley (2016), Logue and Watanabe-Rose (2014), Mireles et al. (2014), and Royer and Baker (2018) concurred that this method has been successful in student completion. Despite the early success, Edgecombe and Bickerstaff (2018) argued that while corequisite learning is a step in the right direction, learning support does not end with 30 credit hours; and it should be integrated throughout the academic experience.

There are numerous side benefits to the corequisite model when compared to the more traditional sequential developmental courses prior to the credit-bearing gateway course. Developmental learning has always been concerning as it adds to cost and time to degree (Lucas & McCormick, 2007; Mitchell, 2014; Scott-Clayton & Rodriguez, 2014); the corequisite model helps to combat these shortfalls by putting students directly into their required core courses, saving the time and money required to complete prerequisite courses prior to enrollment (Belfield, Jenkins, & Lahr, 2016; Mireles et al., 2014).

Success in Gateway Algebra

Nearly all students earning a bachelor's degree completed an entry-level math course, and many of them likely took College Algebra, regardless of their program of study. Recent placement trends, however, focus on appropriate math pathways for students based on their major (Massachusetts Department of Higher Education, 2018; Merseth, 2011). College Algebra should be for students progressing to Calculus, which narrows down the population needing this traditionally challenging course (Complete College America, 2019). This shift not only places students in a more useful course for their degree, but also decreases the number of students needing developmental courses. Rutschow, Diamond, and Wallender (2017) wrote that 50-70% of community college stu-

dents enter unprepared to take College Algebra with less than 20% ever passing the course. Rodriguez et al. (2017) found significantly higher success rates for California community college students taking statistics or compressed algebra pathways over the traditional algebra paths. Completion barriers like this are key to CCA and CCG initiatives and were recently implemented in USG colleges and universities, along with the new corequisite model for gateway mathematics learning.

Reviewing the literature on college completion initiatives, gateway course success programming, and developmental learning systems showed that corequisite learning is the trending best practice, adopted by national and state college completion groups. Research on corequisite success is still limited, however, especially in conjunction with higher level gateway math courses like College Algebra. This study adds to the literature in this area of educational pedagogy and informs future practice.

METHODS

With corequisite learning now the sole method of college readiness coursework in Georgia, and little definitive research on its success thus far, there is a need to examine early trends of student performance. This study begins that work, comparing students at one institution who completed corequisite support for College Algebra with those who did not.

Participants

Participants for this study were enrolled at a public Carnegie Doctoral/R2 comprehensive institution in the University System of Georgia offering associate, bachelor, master, and doctoral degrees. This multi-campus institution enrolled over 26,000 students for the fall 2018 term with over 87% undergraduate enrollment. Participants were from the fall 2017 (3,561 students) and fall 2018 (4,362 students) cohorts of new freshmen enrolled at one campus of the university. Institutional Research from the university defined the student records provided: “first-time freshmen are first-time, full-time, degree-seeking only” and “includes first-time summer and fall students” as well as “advanced placement students above the freshman level and joint enrolled students becoming regular students (Institutional Research, personal communication, February 13, 2019). These groups were narrowed down to represent (1) fall 2017 students who took College Algebra during the fall 2017 term and would have been required to enroll in corequisite support if the USG requirement had been in place during their enrollment, and (2) fall 2018 students who took College Algebra during the fall 2018 term and were also enrolled in—

DOI: 10.20429/gcpa.2019.350103

and completed—required corequisite support.

To prepare the fall 2017 cohort for analysis, student records meeting the following criteria were removed: had a summer matriculation term, were considered freshmen transfers, did not have a MATH 1111 (College Algebra) grade, had a MATH 0999 (corequisite support) grade, and had a MATH 1111 W or WF grade. Next, each MATH 0999 exemption criteria was applied to remove students who would have been exempt had the requirement been in place for fall 2017: Area A math credit, math placement index over 1265, high school grade point average over 3.40, ACT math test equal to or over 20, old SAT math test score equal to or over 470, redesigned SAT math test score equal to or over 25.5, or ACCUPLACER elementary algebra score equal to or over 79. After all record removal, 158 records remained.

To prepare the fall 2018 cohort for analysis, student records meeting the following criteria were removed: had a summer matriculation term, were considered freshmen transfers, did not have a MATH 1111 grade, did not have a MATH 0999 grade, and had a MATH 0999 or MATH 1111 W or WF grade. Two additional students were found to have met exemption criteria as listed above but still enrolled in MATH 0999; both student records were removed. After all record removal, 55 records remained. Table 1 shows a demographic overview of the two groups.

Table 1. Cohort Demographics

Cohort	Mean Age	Sex	Race/Ethnicity
Fall 2017 *(No Corequisite)* *(n=158)*	18.22	55.1% female 44.9% male	4.4% American Indian/Alaskan Native 1.9% Asian 25.9% Black/African-American 5.7% Hispanic 1.9% Two+ Races 59.5% White 2.5% Unknown
Fall 2018 *(Corequisite)* *(n=55)*	19.05	43.6% female 56.3% male	3.6% American Indian/Alaskan Native 0.0% Asian 40.0% Black/African-American 14.5% Hispanic 3.6% Two+ Races 36.4% White 1.8% Unknown

The fall 2017 group who did not take the corequisite course tended to be slightly younger than the fall 18 group who did participate in the corequisite course. The fall 17 group was majority female whereas the fall 18 group was majority male. The groups presented slightly different race/ethnicity breakdowns as well, with the fall 17 cohort being over half white, followed by just over a quarter Black/African-American. The fall 18 cohort, however, was 40% Black/African-American followed by 36% White. Hispanic students also made up a larger portion for fall 18 group than for fall 17. Both groups are representative of the overall university demographics in age, sex, and race/ethnicity. An overview of the groups' academic achievements is presented in Table 2.

Table 2. Cohort Academic Achievement Means

Cohort	Mean High School GPA	Mean SAT Total Score	Mean ACT Composite Score
Fall 2017 *(No Corequisite)*	2.86	1049.64	21.73
Fall 2018 *(Corequisite)*	2.70	1040.32	20.15

The fall 2017 group had a higher mean high school grade point average, SAT total score, and ACT composite score than the fall 2018 group. It is important to note that admissions requirements changed for fall 2018 incoming freshmen at the university studied. The minimum high school grade point average rose from a 2.0 to a 2.5. The SAT total lowered from a 1090 to a 1030, and the ACT composite lowered from a 21 to a 20.

Data Collection and Analysis

Data were gathered at a single point in time and included multiple demographic points, information related to corequisite support requirements, corequisite course grades, and College Algebra course grades. The independent variable was enrollment in College Algebra corequisite support and the dependent variable was the grade earned in College Algebra. Descriptive statistics were used to show frequency (count and percent) and central tendency (mean) of sample students' age, sex, and race/ethnicity as well as mean of academic achievement levels. A chi-square analysis was used to determine if a relationship exists between the noted variables.

DOI: 10.20429/gcpa.2019.350103

Data were provided from the university's Department of Institutional Research and the primary point of comparison for this study was earned grades in College Algebra. College Algebra was graded on a letter scale of A, B, C, D, or F; passing—or successful—grades include A, B, and C. The university catalog description for College Algebra, or MATH 1111, defines the course:

> This course provides an in-depth study of the properties of algebraic, exponential and logarithmic functions as needed for calculus. Emphasis is on using algebraic and graphical techniques for solving problems involving linear, quadratic, piece-wise defined, rational, polynomial, exponential, and logarithmic functions.

The differentiation between comparison groups is Support for College Algebra, or MATH 0999. The University System of Georgia provided this course description:

> This Learning Support course provides corequisite support in mathematics for students enrolled in MATH 1111 – College Algebra. Topics will parallel topics being studied in MATH 1111 and the course will provide support for the essential quantitative skills needed to be successful in MATH 1111. Taken with MATH 1111, this course provides an in-depth study of the properties of algebraic, exponential and logarithmic functions as needed for calculus. Emphasis is on using algebraic and graphical techniques for solving problems involving linear, quadratic, piece-wise defined, rational, polynomial, exponential and logarithmic functions. (University System of Georgia, n.d.)

Limitations

Several limitations were found prior to and during this study. Because this study looked at specific cohorts affected by state governing board policy changes, it is not one that could be replicated. Also, there were small and uneven population counts between the two groups. Prior to receiving the data sets, it was expected that the fall 2017 group would be smaller than the fall 2018 group due to new lower admission criteria. The opposite was true, however, with the fall 2018 group being one third the size of the fall 2017 group. Upon review of additional policy with the Director of the Academic Success Center at the university studied, this is attributed to better student placement into the appropriate math for their respective majors (personal communication, February 13, 2019).

Another limitation is that the review was only of the first cohort of students since implementation of the College Algebra

corequisite requirement. Over time, staff and faculty could modify instructional methods for this new course leading to changes in outcomes. It should also be noted that most of the previous research in the area of corequisite learning is regarding lower-level mathematics courses and not College Algebra. As a higher-level math course with higher exemption criteria, comparison to other research may be considered less applicable. While that does not impact the findings of this study, it is inaccurate to fully equate it to previous research, supporting the case for additional study on this level or course.

FINDINGS

This study sought to answer if a relationship existed between required corequisite support and success in gateway College Algebra courses. The results of the chi-square test for independence were significant (X^2 = 4.593, df = 1, p = 0.32), confirming the presence of a significant relationship between these variables. Earned grades of A, B, and C in College Algebra (MATH 1111) were grouped as they are the successful, passing grades. Earned grades of D and F were grouped as they are the non-successful grades. Table 3 shows these groupings, with a larger portion of A, B, C grades for the fall 2018 group (72.7%) than the fall 2017 group (56.3%). From this analysis, it can be determined that students who enrolled in a corequisite math course did better in College Algebra than those who did not enroll in the corequisite.

Table 3. College Algebra (MATH 1111) Grades by Cohort

Cohort	MATH 1111 A, B, C Grades	MATH 1111 D, F Grades	Totals
Fall 2017 *(No Corequisite)*	89 56.3%	69 43.7%	158 100%
Fall 2018 *(Corequisite)*	40 72.7%	15 27.3%	55 100%

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DISCUSSION

Higher education is facing a number of obstacles: greater scrutiny of success measures like retention, progression, and graduation; shifts in the demographics of high school graduates with a majority of minority racial and ethnic groups; overall decreases in high school graduates; and increases in adult learners. All these issues have led to new methods of course support with a focus on remediation. The University System of Georgia recognized that successful remediation can be key to progression for many students and corequisite learning is central to their efforts. The purpose of this comparison study was to inform the use of corequisite support for College Algebra and the overall learning support policy of the USG, determining if early success could be found at the institution studied.

Results of this study showed that students who took the corequisite support course (MATH 0999) alongside College Algebra (MATH 1111) earned an A, B, or C grade at a rate of 72.7%, whereas students who did not participate in corequisite learning earned those passing grades at a rate of 56.3%. The outcomes of this research is consistent with findings from Brower et al. (2017), Complete College America (2012, 2019), Denley (2016), Logue and Watanabe-Rose (2014), Mireles et al. (2014), and Royer and Baker (2018), all of which asserted that corequisite learning support produced positive results in gateway course completion.

Brower et al. (2017) looked at different versions of scaffolding for learning support–using additional knowledge or support to build up the student's own independent knowledge. Examining mathematics in Florida, Brower et al. (2017) found that corequisite learning was just one example of these methods, but all focus groups agreed on the positive effects of concurrent support through corequisite work.

Complete College America has been touting the success of corequisite coursework for years, and the *Spanning the Divide* website used early data from Georgia to back up the focus on the topic (Complete College America, 2019). CCA presented the national rate of gateway math completion within two years using traditional foundation remediation at 22% with the Georgia completion rate of gateway math within one year using corequisite remediation at 63%. This study showed completion of College Algebra as a gateway math within one semester with corequisite remediation at nearly 73%.

Denley (2016) presented research from Tennessee, showing higher retention rates of students who learned using corequisite models versus prerequisite models, tying success in gateway coursework to progression. Denley's research supported the longitudinal study by Logue and Watanabe-Rose

(2014) finding that students who took the corequisite support version of math instead of the prerequisite earned more credits early on in their college work, passed future math courses, and graduated at higher rates than those who started in the foundational prerequisite courses. And while Logue and Watanabe-Rose's work (2014) varied from the current study as a controlled experiment looking at a lower level of mathematics, inferences can be made that these students may be more prepared for future courses than their counterparts from the previous year.

Royer and Baker (2018) tracked changes in success with math learning support as the subject institution moved from traditional support to corequisite support, finding more students completed their gateway math and did so in less time. While this study did not compare students who previously would have begun in lower-level math to then reach College Algebra, the fact that corequisite support is required instead of a prerequisite means that more students enroll in College Algebra and therefore are eligible to complete it. This assertion was the finding by Mireles et al. (2014) as well.

IMPLICATIONS

Despite the noted limitations, this study is promising, indicating that corequisite support can lead to greater success for students enrolled in College Algebra. It could also be used to inform expanded models of corequisite learning for more students in additional courses with traditionally high D, F, W rates. This research should be shared with key constituents including the Director of the Academic Success Center, Associate Provost, and Vice President for Enrollment Management. University System of Georgia staff working with Learning Support policy should also consider the implications of this research. These key players can review this study as they look toward new policies or ways to implement existing policies.

Many new options for support are being explored, including embedded peer support and supplemental instruction. Supplemental instruction (SI), a system that uses peers to prepare informal study sessions outside of class in courses that commonly see high numbers of unsuccessful grades, is seeing early traction at Georgia State University (GSU), including resolutions from their Student Government Association to offer more sections ("Georgia State's SGA", 2016). The university studied plans to pilot embedded peer support, similar to the GSU SI, in the summer of 2019 through a summer bridge program. Research from Brower et al. (2017) found success in the peer support models as well. Continuation of these programs could further enhance achievement as they are consistent with corequisite just-

DOI: 10.20429/gcpa.2019.350103

in-time support theory. As higher education professionals who work in student success and persistence initiatives design mechanisms to enhance students progression, these types of programs should be considered. Certainly the new USG policies on corequisite learning should continue, with additional research to strengthen practices.

RECOMMENDATIONS FOR RESEARCH

Due to a small sample size and specific campus reviewed, it is recommended that this study be replicated with additional cohorts and campuses at the university studied, along with different institutions, to increase the number and types of students reviewed. The university studied has a level of selectivity and most admitted students are exempt, or close to exempt, from taking the corequisite learning support course with College Algebra. Boatman and Long (2018) found that students near college-readiness levels were less successful with remediation efforts, so a study of success at state colleges with open access enrollment may be useful. Conversely, Managan's 2019 report in *The Chronicle of Higher Education* asserted that students far removed from content—adult learners in particular—had significant struggles without foundational coursework. Studies considering these variables could produce a larger number of students, lower academic achievement levels, and a greater age span. Examining outcomes at state colleges would provide a better indication of the large-scale impact of remediation through corequisite learning. Demographic variables could also be reviewed within each student group.

While this study focused on College Algebra, corequisite learning is now in place for all college gateway math courses as well as English. There is extensive room to study the move away from foundational level learning support to a solely corequisite model. Also, there are specific criteria used for exemption from these courses. Students who exempted could be examined to assess if all exemption criteria have equal relationships to grades in the gateway courses. And finally, it could be insightful to examine the Calculus grades of those who moved beyond College Algebra with corequisite support. While the course seemed to assist them in passing their gateway math, an additional research question could be if students were prepared for the next math in their sequence.

CONCLUSION

It is critical that academic success professionals, enrollment managers, and higher education administrators continue to seek successful ways to ensure student progression and degree completion. Early research on corequisite support for gateway courses, as supported by this study, shows great

promise in using just-in-time support and instructional scaffolding to give students the supplemental help to move them along their degree path. Additional University System of Georgia research and policy is needed to ensure scalable methods to meet the Complete College America and Complete College Georgia initiatives with system-level support, as has been implemented with corequisite learning this past year.

DOI: 10.20429/gcpa.2019.350103

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DOI: 10.20429/gcpa.2019.350103