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Access with Progress: A Comparative Analysis on the Co-Requisite Model of Developmental Acceleration

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ACCESS WITH PROGRESS: A COMPARATIVE ANALYSIS ON THE CO-REQUISITE MODEL OF DEVELOPMENTAL ACCELERATION

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ABSTRACT

A COMPARATIVE ANALYSIS ON THE CO-REQUISITE MODEL OF DEVELOPMENTAL ACCELERATION

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Students who are required to progress through a developmental education program face substantial barriers in the way of annual retention and program completion. A multitude of models exist on college campuses to improve these outcomes, one of which implements an on-time remediation approach. This co-requisite method is designed to reduce the time in developmental sequencing and stop-out points and accelerate students who are placed into preparatory classes to their gateway courses. As a form of developmental acceleration, students can concurrently enroll in their on-level and remedial courses in the same semester. A comparative analysis was performed between three student subgroups (on-level, accelerated-developmental, and traditional-developmental) to better understand the effectiveness of the accelerated program. Completion rates (grades of A, B, or C), non-completion rates (D, F, or W), and GPA for gateway and subsequent English and math courses were calculated for each subgroup. Confidence intervals and hypothesis tests were analyzed to determine if significant differences existed between the three subgroups. Results from this analysis revealed accelerated-developmental students succeeded at the same rate as traditional-developmental students in gateway and subsequent math courses as well as gateway English courses.

This work is dedicated to the positive human spirit, inherent in all, which inspires, creates, and improves lives through learning.

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First impressions drive many decisions, and my work to complete this milestone began with a phone call to Dr. Williams. Although he was talking to a stranger, his enthusiasm for higher education and my aspirations were honest and pure. It is only fitting that he is my chair, thank you for seeing me through and changing my life.

To my committee and the many other professors who gave their time for my professional growth, thank you. Your program makes people better and, in turn, improves the lives of students who choose community college as a step in their career pathway. ODU is fortunate to have the commitment and faithfulness of these faculty members.

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This work would not be possible if not for my grandmother, whose continual push towards higher education provided my motivation to never give up. My mother, who gives me endless support and promise, thank you. To my wife and children, you are my heartbeat and reason for finishing, I love you all.

And mostly to God for the eternal patience as I continue to learn how to follow his path.

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CHAPTER I

INTRODUCTION

Developmental education, or remedial education as it is commonly referred (Boylan, 1988; Xu, 2016), envelop an assortment of postsecondary programs designed to recalibrate student academic ability. An increase in the amount of criticism is evident over the past several years. Placement test results place the majority of students into developmental math, while only a third complete their remedial prerequisites (Bickerstaff, Fay, & Trimble, 2016). Complete College America (2012) reported that less than ten percent of students who take remedial courses complete their associate degree within three years and what positive effects are realized, are not sustainable (Edgecombe, Cormier, Bickerstaff, & Barragan, 2013). In addition, retention rates of students in community colleges are substantially lower relative to their four-year counterparts. Pruett and Absher (2015) attributed lower retention rates for two-year institutions, in part, to the higher enrollment rate of students who are in need of remedial education and the academic struggles they bring with them.

Developmental courses create additional requirements for students, and for those who qualify for financial aid, less subsidy may be left to apply towards courses to complete a program and credential. These outcomes, measures, and events create barriers for students in remedial education to overcome. In addition, many of the required remedial courses serve as prerequisites to on-level courses, thus preventing students from progressing through their studies until a passing grade is earned in all developmental courses. The combination of sequenced developmental coursework, the cost to pay for these classes, and the lack of success in developmental program completion creates more opportunity for failure than success.

Administrators and faculty alike are trying ways to mitigate these barriers and provide students with more opportunities to succeed while maintaining the remedial work needed to identify and address content deficits (Arendale, 2011). One way to meet this demand is to provide remediation alongside on-level coursework, which embeds on-time remediation into a co-requisite course. Also a method of developmental acceleration, this way of remediation allows students to forego the sequential nature of developmental and on-level courses for an opportunity to complete both at the same time. As a result, instructors have the opportunity to tailor remedial topics to the needs of the student, thus aligning their voids to the content and correcting the problem in a timelier fashion. Adams, Gearhart, Miller, and Roberts (2009) described this process as "integrating [developmental students] into a college-level course and then providing additional support in the form of a second course" (p. 57).

This accelerated developmental practice has expanded across many schools, of which, one was the focus of this study. A small rural community college in Virginia has implemented this approach across two developmental redesigns; one for math which began in the spring semester of 2012, and one for English which began in the spring of 2013. Borrowed from the Community College of Baltimore County (CCBC), this developmental program is termed the "Accelerated Learning Program," or ALP (Adams, Gearhart, Miller, & Roberts, 2009), and this is the only community college in Virginia to utilize the ALP for both English and math. While positive anecdotal evidence existed, a formal evaluation of the program had not occurred. From a national perspective, the existing research on accelerated programs is limited, lacks a control group, and has inadequate longitudinal data (Jaggars, Hodara, Cho, & Xu, 2015). The current study provides data to address these areas. In addition, the system for which this community

college is part of plans to expand a version of the ALP in math statewide to all twenty-three community colleges by fall of 2018. A version of the ALP already exists statewide for English.

Background of the Study

Institutions have implemented developmental education in a multitude of ways since the beginning of American higher education. Through time, a theme developed as Arendale (2011) noted, "Developmental education expanded its service to more students not due to an intelligent plan, but as a natural response to growing needs by an increasingly diverse heterogeneous college student body" (p. 59). Horner and Lu (1999) echoed this theme and noted developmental education as "the binary of political activism and academic excellence" (p. 14). In both cases, the authors attributed shifts in developmental education to policy decisions in higher education, rather than sound pedagogical theory and practice. Appropriate change represents the product of both political reasoning and grounded theory. Developmental education is not immune to this combination, for which, implementation of such programs should not be solely used as a means to increase enrollment in hopes of moving a few students to on-level coursework. Remedial programs should also be founded in educational theory in order to maximize student success.

The early 2000s brought a push for access into community colleges. Given the open-admissions policy and mission to the community, two-year institutions were the access point for many students who otherwise would not have an opportunity for higher education. With this came a need to provide support for those who were not college ready, of which, past and current nationwide trends show the majority of new enrollees require some amount of remedial education (Everett, 2015). Thus, developmental education classrooms were filled with many students. For the Virginia Community College System (VCCS), and many other states, remedial courses were offered sequentially and for students placing lowest on the standardized placement

test, this meant more developmental education content than students placing at or near on-level on the initial exam (Xu, 2016). While the idea behind developmental education during this time was to provide distinct instruction capable of calibrating below-level performing students to on-level ability, the data do not provide evidence of successful on-level completion for this group of students (Cafarella, 2012). For many institutions, retention, persistence, and graduation rates have decreased or remained static, and underrepresented groups have shown little to no increase in these areas (Everett, 2015; Xu, 2016)). With very little research to validate sequential developmental education, both remedial work and the access initiative were in flux. As Xu (2016) noted, "Access without progress is no more than an empty promise" (p. 496). As administrators and faculty alike saw the stagnant results, a need to refocus became priority. Not only should community colleges focus on providing access to all, but progress and success should be at the forefront of the student experience. Access alone will not change lives, a comprehensive plan that takes students from start to finish is needed.

To address this need, one area of focus is the number and pathway of developmental education courses which students must navigate to get to on-level coursework. In other words, the more obstacles that are in a student's way, the more likely a student is to not succeed (Adams et al., 2009). Current changes across developmental offerings are evidenced across many states, as a recent push for optional remedial courses has been implemented. The state of Florida has adopted an optional model of developmental education and is a result of legislators who mandated that institutions give the student final choice for enrollment in developmental coursework (S.B. 1720, 2013). In addition to the opt-out policy, students enrolling in Florida institutions are provided with other developmental education options, such as co-requisite

courses which provide a remedial course in conjunction with on-level course (Park, Woods, Richard, Tandberg, Hu, & Jones, 2016).

Other states, such as California, North Carolina, and Virginia, have implemented changes to their preparatory programs. Through multiple measures, California and North Carolina have implemented a criterion-based placement system, as opposed to a single instrument to determine what level a student should begin their English and math coursework (Ngo & Kwon, 2014; Park, Woods, Richard, Tandberg, Hu, & Jones, 2016). Over the course of two years, Virginia implemented a redesign in the form of modularized developmental math offerings and co-requisite developmental English offerings (Edgecombe, 2016). In all four states, patterns develop and focus on more accurately assessing a student's ability and matching it to the appropriate course as well as shortening the length of time a student spends taking developmental education courses. The balance of policy and practice appear to be working together.

In addition to this partnership, the value of a change in policy or practice should be formally assessed to validate the decision. Specific to Virginia's case, the effectiveness of the co-requisite offerings in English has not been evaluated. For remedial math courses, research on the modularization of the developmental math curricula (the framework chosen for the 2012 redesign) has occurred and shows minimal effects (Bickerstaff et al., 2016). This may be a reason for the system's shift to offering a statewide developmental math curriculum that mimics the current system-wide implementation of the English co-requisite model.

Currently, a math co-requisite model is in place at one of the Virginia community colleges. Along with the English co-requisite offerings, both have been in existence for several years. Evidence regarding the success of students and whether or not co-requisite courses are

effective is minimal. This study addressed the issue by way of analyzing retrospective data regarding student GPA, drop-out rates, and completion data. A study of this sort is not only significant to the institution, but also to the system in which it is a member. Beginning in fall, 2018, the state of Virginia is looking to implement co-requisite math courses system-wide. These data provide insight into student performance for co-requisite implementation across all twenty-three community colleges in Virginia. English co-requisite courses have been in place for the entire system since 2013 and can benefit from the same examination as little has been done in the form of measuring student withdrawal rates and completion percentage.

Problem Statement. Developmental education is in distress. After completing a one-day assessment to capture everything the student knows about English and math, a course placement is given to the student resulting in an on-level pathway or remedial pathway. Nationwide, subpar placement scores sort the majority of students into developmental education courses (Hern & Snell, 2014). This majority is comprised of many underrepresented populations (Xu, 2016), of which, sequential developmental education is not contributing to gains in retention or graduation rates (Everett, 2015). One way of resolving this problem is to remove the linear nature of remedial offerings and add developmental instruction to gateway (first English and math) on-level courses. The Virginia Community College System (VCCS) has implemented this approach in their developmental English offerings and will do the same with developmental math by the fall semester of 2018. One college within the VCCS is already implementing both co-requisite developmental English and math courses, however, neither have been evaluated. Given the statewide implementation of the co-requisite concept, it is imperative to assess the effectiveness of this program. This study assesses the GPA, non-completion rate and completion rate of students enrolled in gateway English and math courses, along with their performance in

their subsequent English and math courses. Understanding more about student performance within the parameters of the accelerated model not only helps students at the local level, but also provides benefits at the system level, as these quantitative data generalize to other colleges within the VCCS.

Purpose Statement

The purpose of this study was to evaluate the Accelerated Learning Program (ALP) offerings at a small rural community college in Virginia. Quantitative data were gathered retrospectively and three groups of students were created. Group assignments were determined by the student's results on an initial placement instrument and subsequent enrollment actions (on-level placement, developmental placement without ALP, developmental placement with ALP). Since the placement test determines the students' pathway, a random control and treatment group was not feasible, thus the design was quasi-experimental. A comparative analysis established whether significant differences existed between each group to determine whether students receiving the co-requisite model succeed at the same rate as the other two groups. This study provides support in the way of assessing the effectiveness of the ALP, thus contributing to the current body of knowledge of accelerated developmental education offerings.

Research Questions

The following research questions guided the study:

1) Do significant grade differences in math exist between developmental students, ALP students, and on-level students?
    a. ALP students have a higher gateway math course GPA than developmental students.
    b. ALP students have a higher gateway math course GPA than on-level students.

c. ALP students have a higher gateway math course completion rate than developmental students.
d. ALP students have a higher gateway math course completion rate than on-level students.
e. ALP students have a higher subsequent math course GPA than developmental students.
f. ALP students have a higher subsequent math course GPA than on-level students.
g. ALP students have a higher subsequent math course completion rate than developmental students.
h. ALP students have a higher subsequent math course completion rate than on-level students.

2) Do significant grade differences in English exist between developmental students, ALP students, and on-level students?
    a. ALP students have a higher gateway English course GPA than developmental students.
    b. ALP students have a higher gateway English course GPA than on-level students.
    c. ALP students have a higher gateway English course completion rate than development students.
    d. ALP students have a higher gateway English course completion rate than on-level students.
    e. ALP students have a higher subsequent English course GPA than developmental students.

f. ALP students have a higher subsequent English course GPA than on-level students.
g. ALP students have a higher subsequent English course completion rate than developmental students.
h. ALP students have a higher subsequent English course completion rate than on-level students.

The results of this study provide new information regarding the performance of the ALP, which combines an on-level and remedial course. The time for a formal evaluation is due, given the existence of these accelerated offerings in both subjects for several years. An examination of completion rates and GPA for three groups of students in English and math gateway courses were gathered. The three groups were students who, after completing their placement test were (a) placed directly into their on-level course, (b) placed developmental and elected to enroll in the ALP, and (c) placed into developmental courses and completed their developmental pre-requisites to then enroll in their on-level course. Subsequent English and math course completion rates and GPA were also measured for the three groups.

Professional Significance

Acceleration in the developmental education environment is gaining traction across institutions and higher education systems alike (Cafarella, 2012). Legislatures are pushing colleges to create alternative pathways that lessen, or better utilize, the amount of time students spend remediating in order to reduce the likelihood a student drops out due to life circumstances (Jaggars, Hodara, Cho, & Xu, 2015). In addition, other factors that serve as negative stalwarts to student attrition are non-contextual coursework and one-shot placement testing (Jaggars et al., 2015). The ALP is implemented in a way that addresses all three areas. Acceleration shortens

the amount of time students are in developmental education, as it allows students to forego time spent solely in remediation and take both on-level and remedial coursework at the same time. The developmental coursework that is co-requisite to the on-level course is grounded in on-time remediation, thus the content directly relates to the on-level concepts. For students who perform poorly on their placement test, the opportunity exists for students to get out of developmental coursework quicker by taking an ALP course.

Even with the perceived benefits of the ALP, there is very little research available regarding the evaluation of such programs. As Jaggars, Hodara, Cho, and Xu (2015) noted, "Despite the purported benefits of accelerated developmental education, research on the topic remains sparse" (p. 6). Critics of acceleration also contend what research has been done is unconvincing, as studies lack control groups and provide no longitudinal analysis (Jaggars et al., 2015).

This research adds to the small body of knowledge by providing information that mitigates differences between groups (e.g. developmental placement without ALP and developmental placement with ALP) and collecting data on groups of students longitudinally, by way of subsequent course performance. While a control group consisting of random students who were randomly placed did not exist, the developmental without ALP subgroup served as the baseline with which the ALP subgroup was compared.

Another area this research serves is the evaluation of the ALP with regards to mathematics. Co-requisite course data for math was gathered as part of this study and provides helpful insight as to whether the ALP is adaptable to the subject of mathematics. Results in favor of an effective ALP can be used to expand the concept of co-requisite courses in subjects like science, skilled trades, social sciences, fine arts, and humanities.

The importance of this study provides insightful information to those in the teaching profession, as well as institutional research. For instructors who teach sequential developmental math courses, tremendous struggles of students with material that is not applicable to their course of study is commonly experienced. Instead of having an opportunity to progress through a course of study in hopes of completing a credential, students flounder in developmental education, expending thousands of financial aid dollars and pressing the limits of the 150% rule of Pell-allowance. Institutional research offices are continually improving their processes to effectively and appropriately evaluate the viability of programs across their institution. It should be the expectation to implement and assess programs for the sake of student success. Institutions must strive to become better educational advocates for student completion, an obligation to their community that should not be taken lightly. This study exemplifies this practice of evaluation, of which, should be a general practice for any program on a higher education campus.

Results of this study should be used by faculty and administrators to support the implementation of the ALP on their campus. Specific to at least three states (Ohio, Tennessee, and Virginia), performance-based funding is now a component of annual state allocations. Components of this budgeting shift include program completion, credit attainment, and fall-to-fall retention (Letizia, 2016; Stuart, 2010). The ALP could be a potential success tool that could be utilized on campuses within these states. For Virginia, it is paramount to gather more information regarding the ALP, as it is not only embedded in the current developmental English program, but will also be implemented statewide for developmental math in 2018.

Overview of Methodology

This study evaluated an accelerated program in developmental education at a small rural community college in Virginia. Retrospective data were gathered from gateway English and

math courses starting in the fall of 2010 through the spring of 2017. Subsequent English and math data were collected and analyzed in the same manner as the gateway course data. Within each gateway course, three groups of students were identified. The group which students were a part of is determined by an initial placement test, a diagnostic entrance exam that students take before starting their coursework. Student placement scores were contained in the student's profile and were sorted by students who were identified as needing developmental coursework and those who placed on-level and were not required to complete any developmental coursework. The third group was the accelerated group who were initially placed into developmental coursework. Students who placed within two modules of their gateway math requirement were given the opportunity to forego their sequential remedial work and enroll in the accelerated gateway course, which entails the traditional on-level course and a co-requisite remedial course.

English placement is slightly different as students were placed in one of three categories: developmental, accelerated, or on-level. Developmental English students must complete one developmental English course, then enroll in the on-level course the following semester. Accelerated students enrolled in a gateway English course with a co-requisite remedial course and, lastly, on-level students enrolled in a gateway English course with no other stipulations. On-level placement is similar to ALP placement, but without the co-requisite course. Essentially, each gateway course, whether it was English or math contained (a) students who completed all developmental pre-requisites in sequence prior to their enrollment in the gateway course, (b) students who were identified as needing remediation, but opted to take the gateway course along with a co-requisite developmental course, and (c) students who were on-level and did not require developmental education.

Since there are three groups, one of which was the focus of this study, a comparative analysis was performed between groups to better understand how each group compared relative to the others. Data came from course grades as well as course withdrawals, thus were quantitative in nature. All grade information was gathered from prior academic years and, given no random control group, followed a quasi-experimental framework which utilized an ex post facto design. Data were gathered using a large database which housed all student placement test information as well as course and grade information. To extract these data, queries within the database were created to gather grade information as well as developmental placement for every student enrolled in a gateway English or math course for the academic years 2010-11 through 2016-17. In addition, all subsequent English and math grade data were gathered for the period.

All data were downloaded into an Excel spreadsheet which was the tool used to process all data and calculate the results. The analysis consisted of computing an overall completion rate (aggregated total of A, B, and C grades, divided by the total grades) within the gateway course for each respective group. A non-completion rate was also calculated for each group and further disaggregated by letter grade (D, F, and W). For all analysis areas (GPA, completion rate, and non-completion rates) a difference between groups was computed and a margin of error calculation was performed using a normal distribution for rates and a T-distribution for GPA. Utilizing the sample proportions and sample mean, in conjunction with the margin of error, a 95% confidence interval was created. Inferences regarding the three groups were made according to the results of the confidence intervals, specifically, whether the interval is bounded by a negative and positive value. For any confidence intervals with a negative and positive bound, the determination was the plausibility there were no distinct differences between the two subgroups of students (as this type of interval contains zero). For any confidence interval that

did not have a negative and positive bound, the conclusion was a distinct difference between the two subgroups.

In addition to the confidence intervals, hypothesis testing was performed with the null hypothesis being no difference between each group. The differences of the three groups tested (on-level/developmental, on-level/ALP, and developmental/ALP) were gauged against a significance level of $p < .025$ for a two-tailed hypothesis. The hypothesis testing was performed on GPA difference, completion rate difference (A, B, or C) and non-completion rate differences (D, F, or W). Grades for completion rates were aggregated as one rate, whereas non-completion rate grades were disaggregated due to different meanings for each grade. A grade of "D," while a non-complete grade, allows the student to proceed to the next course. The course in which the "D" grade was received will not transfer to a four-year institution. A grade of "F" implies the student was enrolled for the entire course duration and had a final average below 60%. Students who received a "W" completed a formal withdraw for the respective course and were not enrolled for the entire duration of the course.

Delimitations

Acceleration in the educational environment can mean many different things. Even acceleration within the developmental environment can take on multiple meanings. Developmental acceleration could imply the linking of two developmental courses in one semester that are commonly taken sequentially across two semesters (Edgecombe et al., 2013). For the sake of this study, acceleration took on a different meaning, one that accelerates students requiring developmental coursework to their on-level class, but requires a remedial co-requisite course to provide supplemental help as needed (Adams et al., 2009).

This study contains results that are quantitative and do not provide information that is qualitative in nature. Findings were derived by statistical inference and do not ascertain as to the thoughts, feelings, or decisions of students who decide to enroll in the accelerated program, nor drop out of a gateway or subsequent course. Data were retrieved from past academic years in order to allow time for students to have an opportunity to enroll and complete a subsequent English or math course.

It is a policy requirement that all students be tested to determine initial placement in English and math, negating the opportunity for random student placement into a pathway. Consequently, a quasi-experimental design was best suited for this evaluation.

The evaluation of the accelerated learning program occurred at a small, rural community college in Virginia. This school is a part of a larger state community college system, however, it is the only college (out of twenty-three) that currently offers accelerated forms of both English and math gateway courses. In addition, this institution has offered these courses for several years and has seen a tremendous amount of anecdotal success. At this college, accelerated courses have gone through the ebb and flow of course scheduling, faculty professional development, and appropriate student/faculty ratios in order to appropriately implement the accelerated learning program.

Students have choice in the enrollment of a gateway English or math course, as based on their program of study. For example, a student in a STEM-based degree is required to take a pre-calculus gateway course, whereas, a student majoring in a liberal arts-based field is required to take a math for liberal arts course. The difference in pathways present gateway to subsequent course combinations that were carefully sorted out for this study.

In addition to variation of programs, placement in the ALP is also variable, as it relies upon advising. Advisors are trained on the guidelines for placement into ALP (lacking one or two modules prior to gateway enrollment) and provide students with this option. Students then make the final determination regarding whether the ALP is a viable option.

Definition of Key Terms

Acceleration – A form of developmental education that "involves the reorganization of instruction and curricula in ways that facilitate the completion of academic requirements in an expedited manner" (Edgecombe, 2011, p. ii).

Accelerated Learning Program (ALP) – A type of acceleration whereby the program, adopted from the Community College of Baltimore County (CCBC), pairs a co-requisite course with a gateway English and math courses (Adams et al., 2009).

COMPASS – A diagnostic tool administered (2010-2012) prior to initial enrollment to place students in developmental education or on-level coursework in English and math.

Completion rate – The ratio of students who completed a course with a "C" or higher divided by the total number of students enrolled.

Co-requisite course – The remedial component of the ALP in the form of a course that is typically scheduled immediately after the gateway course and provides supplemental instruction to reinforce concepts learned, as well as on-time remediation to strengthen conceptual weaknesses (Adams et al., 2009).

Developmental Education – Typically, a set of courses designed to calibrate the student from not being on-level to being college ready (Park, Woods, Richard, Tandberg, Hu, & Jones, 2016).

Gateway Course – The initial math or English course taken by students who place on-level, finish all developmental pre-requisites, or qualify for the ALP.

On-level – The term used to denote that a student is college ready.

On-time remediation – A reaction-based remedial support that provides timely instruction when the student identifies the need for content-specific help (Adams et al., 2009).

Remedial Education – For this study, a term used interchangeably with developmental education and retains the same definition.

STEM-based program – Program offerings that are grounded in the fields of Science, Technology, Engineering, or Math.

Subsequent course – The course that is denoted as the second course after the gateway course according to the students' program of study.

Virginia Community College System (VCCS) – Grouping of 23 community colleges in the Commonwealth of Virginia, which contains a centralized system office, known as the VCCS.

Virginia Placement Test (VPT) – Diagnostic tool administered (beginning in 2012) prior to initial enrollment to place students in developmental education or on-level coursework in English and math.

Summary

Student success is paramount relative to any other function on a higher education campus. Community colleges are tasked with the challenge of remediating an extensive and diverse group of students who have more than likely struggled with English and math all throughout their lifetime. It is the obligation of the institution to seek out and try methods that show potential and can translate to the respective college environment. The Accelerated Learning Program (ALP) provides an educational program designed to shorten the amount of time students spend in developmental education as well as give relevant remediation that better fits the content of the on-level course. Formal evaluations of English and math courses have not been completed and thus are the focus of this study. Given the extensive implementation of the accelerated programs in the state of Virginia, it is essential that an evaluation be performed on the Accelerated Learning Program.

CHAPTER II

LITERATURE REVIEW

Upon entry, more than half of students enrolling in community colleges are given a pathway that begins with pre-college content and instruction (Bailey, Jeong, & Cho, 2010). Designed to recalibrate the English and math deficiencies of the student (Hern & Snell, 2014), placement into developmental education results in significantly lower completion rates when compared to those who do not enroll in remedial work (Pruett & Absher, 2015). While the lack of college preparedness of the entering student could be evident in the expansive enrollment in developmental education, Bailey et al. (2010) noted the ambiguity of the definition of 'college-level' and the discrepancies between states, colleges, and programs alike. The malleable line between who is, and is not, college ready creates barriers for students to overcome and curricular challenges for community colleges.

Different definitions and sorting mechanisms make for a subjective threshold that places students above or below the remedial mark. As opposed to a student's academic aptitude, pathways are essentially defined by the state and school for which initial placement could have potential consequences that result in a dropout scenario (Cafarella, 2016). The criticality of appropriate placement warrants intentionality on behalf of community colleges, however, incremental research has taken place to determine whether placement tests provide appropriate pathways for students (Belfield & Crosta, 2012). To add to these complexities, state legislatures have a growing displeasure regarding low success rates in remedial programs. By implementing empty incentives (holding back previous allocations) such as funding models, legislatures hope to encourage institutions to deepen their focus on success, all the while maintaining the open access mission of the community college (Cafarella, 2016).

It would be difficult to argue the success of access community colleges have observed as evidenced by increased student enrollment over the past several years. Gaining traction though, is an overwhelming amount of criticism about how the community college needs to be just as concerned about success, or the completion of a transfer degree or credential that will provide the student with a high-demand skill set or gainful employment. Collins (2008) stated, "students who enroll in and complete their developmental education sequence do as well as students who enter college-ready" (p. 16). The problem arises given so few actually complete their developmental studies. These students comprise a large percentage of the enrollment, but make up a small percentage of completion (Bailey et al., 2010). Given this inequity, gains must be made with this group of students. Many community colleges, as well as state systems are addressing this problem through the implementation of accelerated pathways (Jenkins, Lahr, & Fink, 2017). The goal of acceleration is to provide students who test into developmental education a shorter, or accelerated, path to their on-level courses in comparison to the traditional route.

Bailey et al. (2010) noted, "More than one half of community college students enroll in at least one developmental education course during their tenure in college" (p. 259). Given this immense population of students, it shows a dependency community college have for this population of enrollees. Remedial needs for students who test into developmental studies is clear. The responsibility to provide these students with a pathway to completion is not. Bailey et al. (2010) noted, "Between 33 and 46 percent of students, depending upon the subject area, referred to developmental education actually complete their entire developmental sequence" (p. 256). Merseth (2011) attributed the difficulties developmental students experience to "high failure rates, increased debt burdens, and a lack of credits on transcripts" (p. 32). There exists an

extreme misalignment between the number of students who gain access to community college via developmental courses and the number who complete a credential within this group.

There has been an increase in the frequency of analyses done on the sequence and length of time students who test into developmental courses must spend in developmental education in order to get to their on-level courses. Hodara (2014) noted, "developmental education seems to have a divisionary function, which may be exacerbated by its sequence structure" (p. 249). The amount of time has come under scrutiny given the low percentages of students who actually complete all developmental prerequisites. In fact, the greater the number of developmental courses students are required to complete, the more likely they are to drop out before reaching their gateway course (Adams, Gearhart, Miller, & Roberts, 2009). Further, Hern (2012) found, "the more semesters of remediation a student is required to take, the less likely that student is to ever complete a college-level math or English course" (p. 60). This is particularly concerning given the multitude of pathways across community colleges in the United States, many with different levels students must go through before arriving at their gateway course. Asera (2011) provided more emphasis as to the importance of sequencing and noted, "The very length of the sequence is problematic because the longer the sequence, the more chances there are – in every course and between courses – for students to leave" (p. 29). Clearly, there is a need for improved pathways in developmental education to shorten the length of time students are in the developmental pipeline. Accelerated pathways may be a solution to help developmental students succeed.

With the challenges community colleges face by way of developmental education, there exists a need for a model with a higher probability of success. One method college leaders are focusing on is the use of acceleration within the developmental offerings. Using the impetus of

on-time remediation, a developmental co-requisite course is utilized concurrently with the on-level gateway course (Adams et al., 2009). Offered to students who place marginally below (or complete enough developmental coursework to be within one or two credits of being on-level) the developmental threshold, acceleration helps to mitigate the subjective line institutions use to determine who is, and is not, placed into remedial education. Known specifically as the Accelerated Learning Program (ALP) at the institution in this study, the ALP provides opportunity for students to accelerate through their developmental offerings, shortening the time spent completing non-credit remedial coursework (Adams et al., 2009).

This chapter contains a review of the related literature and research on the topic of acceleration in developmental education. A history of the use of developmental programs is provided, followed by methodologies to advance students to on-level coursework, and concludes with literature specific to the ALP and similar models. The last section will also discuss how this study contributes to the existing body of knowledge that currently surrounds the methodology of developmental acceleration.

While the foundation of this study is grounded in developmental education, precedence must be placed on the reason the majority of students enroll in a community college: to complete a goal that ultimately ends with a credential. The subsequent section provides insight into broader challenges all students face in higher education. The goal is to build a framework for the intentionality and resources woven into developmental education, and ultimately, success for the underprepared student.

Community College Completion

The relevance of time to completion is due to its influence on higher education and the economic landscape. Simply put, students are taking longer to complete a credential

(Kurlaender, Jackson, Howell, & Grodsky, 2014). While the percent of students attending college has risen significantly, the percent graduating has not (Hoxby & Turner, 2013). Specifically, the six-year completion rate (300% of typical associate degree program time) is above 50% for full-time students and 39% for all (Fain, 2015). The employment lag created by those taking longer to complete and enter into a degree-related job, as the literature conveys, is one that negatively affects employers, students, and institutions.

Impact of time to completion for employers. Americans are experiencing a shift in credentialing ideologies for entry, and re-entry, into the workforce. Before the turn of the millennium, employers accepted a high school diploma as the pathway for a meaningful career (Kerckhoff, & Bell, 1998). However, the demands in the current job market utilize a wide range of skill sets and postsecondary knowledge which require a degree or credential (Matheny, Chan, & Wang, 2015). As America moves into the next decade, economists project a labor shortage due to retiring baby-boomers (Matheny, Chan, & Wang, 2015). To prepare for this transition, in 2009 President Obama outlined his American Graduation Initiative, pledging $12 billion for higher education in hopes of producing 5 million additional graduates by 2020 (Whitehouse, 2009). The American Association of Community Colleges (AACC) with the report, *Reclaiming the American Dream*, called for a 50% increase in the number of graduates by 2020 (American Association of Community College [AACC], 2012). During this same time, Lumina Foundation also addressed the need for more college graduates. For 2025, Lumina projected the need for 60% of the workforce to have a postsecondary credential to offset the widening gap between employer skills needs and employee qualifications (Matthews, 2015). The common thread binding these initiatives together is the need for a dramatic increase in credential attainment to better the workforce. Associate degree-seekers share the credentialing load with baccalaureate-

seekers as well, of which the majority take 150% of program time to complete (Kurlaender et al., 2014).

The pace with which the workforce is moving leaves no time for those entering the workforce to make up the experience lost by the retiring generation. The training and acquisition of requisite skills needed to perform at the level of those leaving the workforce is now shifted from the workplace to higher education. This mix of constant technological advances, the need for immediate expertise, and strong intellectual ability returns the influences that shape today's productive companies. Businesses are strained waiting for this intellectual capital to navigate through higher education, again necessitating the need to expedite the developmental pathway so students can begin their course of study and eventually fill the talent voids of short-staffed organizations.

In many cases though, interruptions to completion such as part-time employment contribute to the length of time students take to complete. As Scott-Clayton (2012) noted, "an alternative response for moderately constrained students is to work while enrolled" (p. 193). The choice students make to forego completion to meet interim payments and other present financial responsibilities consumes academic time, delaying graduation (Scott-Clayton, 2012). Most students do not have a choice, as they lack the financial capabilities to afford college without an income stream other than financial aid (Kalenkoski & Pabilonia, 2010). The result is a credential depleted workforce, leaving employers empty-handed when it comes to academically qualified employees.

Impact of time to completion on students. Students have the most at stake when it comes to completion, as employers can hire other people and institutions can enroll different students. The financial aid maze and curriculum hurdles, such as developmental education,

create many barriers to success and slowing the time to graduation. Specific to both financing and attending college, the longer a student takes to graduate, the more money it costs the aspiring graduate (Kim & Ko, 2015; Kurlaender et al., 2014). It stands to reason that if a student were to stop out or drop out for a semester, coming back the following academic year will have a higher cost than if the student had persisted. For students who utilize student loans to finance college, this is a cause for concern. Avery and Turner (2012) noted, "new federal student loans for higher education amounted to $97 billion in 2009-2010: $66.8 billion to undergraduates" (p. 165). This is a troubling figure as students incorporate part-time employment into their college tenure lessening the amount of academic time they have for classes and lengthening the time to completion. It also reveals a focus on short-term benefits over long-term sustainability in terms of economic gains.

In addition to loans, another area where time to completion affects students is the awarding of grants and scholarships (gift assistance). Students receiving tuition assistance by way of a Pell Grant have a maximum of 150% of program completion time to finish a degree (Davidson, 2014a). For a typical associate degree, this allows qualifying students the opportunity to receive a full Pell Grant for up to three years or 6 semesters. As students take longer to complete a degree, those on Pell run the risk of surpassing the amount of time allotted to finish a degree. Given a Pell Grant provides financial assistance to go to college, not having aid would deplete the hopes of completing a degree should the student exceed the amount of time allotted to receive Pell.

Unfortunately, those receiving grants tend to take longer to complete. As Kurlaender et al. (2014) noted, "students receiving grants are less likely to graduate on time than those using loans" (p. 25). Given the extra amount of time allotted for students on financial aid leaves

students who are focused on the short-term benefits no incentive to complete in two years. For students failing to complete within the maximum time, the resulting consequence would crush the hopes of improving students' lives and employability, as well as a waste of taxpayer dollars.

Students also experience decisions regarding opportunity cost as they progress through their studies. Taplin, Kerr, and Brown (2013) defined opportunity cost as "the value of the next preferred good or service you give up buying when you purchase something" (p. 17). In education, the opportunity cost exists when students execute their choice of attending college over employment. Opportunity cost is realized as students forego income while in college, but make it up after attaining a credential that typically earns more than no credential at all. The longer a student takes to complete a degree though, the more the opportunity cost is affected. As Kurlaender et al. (2014) noted, "if students extend time to degree, they may also be increasing the opportunity cost of the college investment, as foregone earnings increase" (p. 24). For students who extend time past two years to complete an associate's degree and are taking out loans to pay for college, they are losing money exponentially as they forego potential "college degree" earnings to finish a degree. Further, the loans taken out to pay for college accrue more interest before repayment, as the student is still in college.

Compiling additional semesters to complete a degree with the rise of tuition and fees results in higher loan amounts. Coupled with foregone earnings due to extended enrollment and students are faced with a growing amount of time spent climbing out of educational debt. For the increasing amount of students with financial aid who venture into their third and fourth year to complete, the taxpayers are the ones not seeing a return on investment, as the students are not maximizing the economic gains from their credential they have not yet earned. In addition, for those students who exceed the amount of time for financial aid and stop out, they forego all

salary and benefits that could have been realized by the completion of a two-year degree. Taxpayers also never see the benefits either in terms of economic growth and labor market productivity.

Impact of time to completion for institutions. Colleges also experience difficulties when students take extended time to complete a degree. Kurlaender et al. (2014) found, "a longer time to degree causes an unplanned increase in the number of continuing students, straining an [institution's] already increasingly scarce resources" (p. 25). Students who linger in the college landscape cause a melding of cohorts. The meshing of students causes extra scheduling needs, increases class sizes and can negatively affect graduation rates (Bound & Turner, 2007). Completion rates also have a direct impact on institutions as many initiatives are now focusing on success and how many students complete in an academic year. These initiatives may be based on meeting targets associated with President Obama's American Graduation Initiative to help increase the amount of people with postsecondary credentials.

Students who return after stopping out would be expected to pay a higher tuition rate than what they would have paid had they not stopped out. However, students taking longer to complete could be seen as a revenue benefit, via increased enrollment, but it is only superficial. For every student that comes back, there is opportunity for many other students who stop out to either quit higher education permanently or go elsewhere for their credentialing needs. The revenue from students who never return is never seen. In addition, what extra revenue is gained from a returning student is quickly resourced out to re-advise and re-acclimate the student as well as other students. Simply put, Kurlaender et al. (2014) noted, "an increase in college students results in fewer resources per student" (p. 26). The more students delay graduation, the less time and money can be devoted to ensuring students complete on time.

Higher education institutions offering undergraduate programs are built and resourced to move students through in two years, hence the term "two-year institutions." The undercurrent which strains higher education reflects a student population who take 150% of program time to complete due to maximized personal resources and thus minimize the efficiency of the institutional assets.

Four-year institutions are also the recipients of two-year transfer students. In many ways, the transfer process manufactures longer time to completion. The lack of widespread articulation agreements contributes to students taking extra credits. Other areas which negatively affect students' degree attainment chances is misalignment between the two institutions involved in the transfer process as well as credits that do not transfer from the community college to the four-year institution (Stern, 2016).

Contributing factors. As global competition increases, the need to continually improve a highly skilled workforce is evident. To meet the deficit of working class knowledge and experience, businesses must rely on higher education institutions to accelerate the learning curve in order to produce graduates capable of becoming an immediate contributor in the work environment (Matthews, 2015). This places the emphasis on increasing completion and identifying best practices that provide greater opportunity for students to succeed (Davidson, 2014b). Two such factors which contribute to this need are continuous enrollment and an increase in the number of credits earned in the first year (Davidson, 2014b). Other factors that contribute to completion are high school achievement, socioeconomic status, race, and gender (Davidson, 2014b; Oseguera & Rhee, 2009). Continuous enrollment, credits earned, and GPA are intrinsic components specific to the student. As Oseguera and Rhee (2009) found, "for a unit increase in a high school student's GPA, a student's probability of persistence to degree

completion increases by 5.9%" (p. 559). In addition, the more credits earned in the first year of college, the more likely the student is to graduate (Davidson, 2014b). Both of these instances contribute to continuous enrollment, or persistence, of the student and denote the importance of limiting the number and completing all of a developmental sequence. Socioeconomic status, race, and gender are all factors the student cannot control and as Davidson (2014b) noted are "pre-college factors" (p. 87). Regardless of whether these factors occur within the education environment or are components which students bring with them to the college, institutions have a responsibility to progress the student. Numerous developmental prerequisites have the potential to delay the time it takes for a student to become on-level, thus negatively contributing to the economic and workforce consequences presented in this section. To further explore how developmental education offerings can mitigate the immense challenges the community college faces, a history follows which traces remedial coursework back to the beginnings of higher education.

History of Developmental Education

At one time intended for a select few, higher education has grown into a system for which almost all Americans have access (Casazza, 1999). In staying true to this American higher education promise, as well as their own mission, community colleges face an ongoing conundrum. As open access institutions, the completion of an application for a high school diploma (or GED) is the student's ticket to enrollment and an opportunity to further their education. Open access, though, does not guarantee college-level ability at the point of entry into community college. The challenge is realized at this point: turn those who are not college-level away and deny the basic mission of the community college, or provide students the opportunity to become college ready so they can complete their intention for enrolling in post-

secondary education. The answer for most colleges is to remediate students and give them the opportunity to become on-level and progress through their course of study. Couched as developmental (or remedial) education (Boylan, 1988), both two and four-year institutions have approached remediation in many different ways since the inception of American higher education.

Dating as far back as the 17th Century, developmental education began as tutoring programs for higher education institutions (Arendale, 2011). Offering courses to remediate students' deficiencies dates as far back as the mid-19th century and the infusion of remedial courses within the institution began towards the end of World War II (Arendale, 2011; Boylan, 1988). With the breadth of implementation and the length of time remediation has been around, Abraham, Slate, Saxon, and Barnes (2014) likened developmental education to a tradition in higher education. This tradition has taken on many forms throughout the past four centuries.

Tutoring. Boylan (1988) placed the beginning of remediation with the founding of Harvard in the mid-17th Century. The need for supplemental education was evident when entering students lacked the requisite skills needed to translate books which were primarily written in Latin (Abraham et al., 2014). To fill this gap, tutors were provided by Harvard to remediate students to the point of attaining reading and comprehension proficiency in Latin (Arendale, 2011). In addition to the foreign language requirements, schools increased admissions requirements by adding mathematics, which continued into the 1700s (Arendale, 2011). As institutions diversified enrollment in the 1800s, colleges accepted a more prevalent role in college preparedness as many of the incoming students came from public school instruction that lacked in the rigor needed for college coursework (Arendale, 2005). In addition to the discontinuity of public school instruction and college preparedness, the 19th Century

contained an influx in the number of fledgling institutions. Brought on by legislation such as the Morrill Land Grant Act of 1862 and the reconstruction era, the creation of higher education institutions saw a growth never experienced before by the United States. For these new institutions, sustainability meant enrollment, which led to the acceptance of many students who were unprepared for college (Boylan, 1988). While tutoring was heavily engrained in the academic culture of institutions, the wave of underprepared students brought a need for institutions to create a more structured approach to college preparation and thus the creation of developmental programs within the institutional context (Arendale, 2002; Brier, 1984).

Remedial Education. From the mid-19th Century through World War II, preparation for enrolling students who were not college ready were given remedial treatments. This process was similar to how a doctor would prescribe a remedy to ail the onset of a sickness (Arendale, 2005). Beginning in 1874, Harvard implemented the first remedial course of its sort, providing English preparatory instruction for students below the academic standards of the institution (Brubacher & Rudy, 1968). Continuing the rapid creation of colleges and universities, legislation such as the Morrill Acts perpetuated the need to calibrate students to college-level coursework as the need to increase enrollment for sustainability efforts was priority (Arendale, 2011). However, as the decades progressed and the need to increase enrollment subsided, universities began to push away from providing remedial education (Boylan, 1988). Even though universities decreased college preparatory programs, the need to educated those who were not on par with post-secondary rigor remained. Post-World War II and the many government legislative pieces such as the Servicemen's Readjustment Act (1944) and the Civil Rights Act (1964) brought the rise of two-year colleges for which assumed the duties of providing remedial programs (Boylan, 1988).

The need for remedial services during this span was strong, as nearly two out of every three students required remediation in order to be college ready (Abraham, et al., 2014).

Developmental Education. The transition from remedial to developmental education is one of institutional process and placement rather than a difference in service provided to underprepared students (Arendale, 2011). As Arendale (2011) noted, "Rather than continuing its earlier tradition of commonly existing at the peripheral outskirts of the academy, developmental education will become more mainstreamed" (p. 71). Instruction to bring students to college-level ability was infused into programs and many services assisted students in hopes of increasing the success rate and transition to on-level coursework. The government once again played a major role in motivating institutions to provide developmental programs. After a long decline in developmental offerings by four-year institutions, government assistance by way of financial aid and The Higher Education Act (1965) incentivized institutions to take on remedial services to prepare students for college-level courses. The financial supports worked, as over three quarters of all higher education institutions offered developmental assistance (Boylan, 1988). Given the immense number of colleges and universities offering remedial programs, a plethora of implementation methods surfaced to help calibrate students to appropriate post-secondary standards.

Recently, a push to condense developmental coursework and exit points has taken different forms and implementations across many community college campuses. The method of decreasing the amount of time students spend in developmental courses is commonly referred to as acceleration. A growing body of evidence shows promising results by way of increased enrollment and completion in these pathways (Cafarella, 2014). While academic factors may contribute to students leaving their developmental program, Jaggars, Hodara, Cho, & Xu (2015)

noted, “It seems likely that external factors (rather than academic difficulties) are pulling these students away” (p. 5). It would stand to reason the longer a student is required to stay in a sequence of developmental courses, the greater the chance a student will face a non-academic obstacle. This may in turn impede or prevent the student from returning to complete the sequence, and ultimately, a credential. The following sections provide literature regarding methods colleges are using to decrease the amount of time students spend in developmental education.

Developmental Education Methods

For this section, a review of the literature regarding programmatic offerings used within developmental education to enhance the likelihood of persistence and success with the student learning experience. To provide remedial services for the majority of those who enroll at a two-year college is a costly venture (Bailey & Cho, 2010). Some estimated the cost of developmental instruction to be in the billions per year (Bettinger, Boatman, & Long, 2013; Quarles & Davis, 2017; Wathington, Pretlow, & Barnett, 2016). While an investment in the services for students could potentially be a success for both the student and institution, developmental education has proven to trend towards ineffective results (Edgecombe, 2016). The need for pathways and catalysts that aid the students throughout their transition from unprepared to prepared college students is paramount to both the success of the students and institution. Outlined in the subsequent paragraphs are ways colleges and systems are attempting to change the landscape of developmental education. The following methods are categorized chronologically by when the student receives the program. Optional developmental programs and summer bridge programs are provided at the beginning of the student experience, whereas, learning communities, modularized offerings, and compressed courses are offered within the developmental sequence.

Lastly, supplemental instruction and the co-requisite model are presented, which signifies the students' transition from developmental coursework to on-level courses. It should also be noted that all of these methods represent a form of acceleration, using the definition provided by Edgecombe (2011), "[Acceleration] involves the reorganization of instruction and curricula in ways that facilitate the completion of academic requirements in an expedited manner" (p. ii).

Optional Developmental Courses. States such as Colorado, Connecticut, Indiana, and Minnesota are looking at models that allow students to opt-out (or opt-in dependent on the legislation) of developmental education (Nelson, 2015). Connecticut's legislation mandates that remedial work be engrained into on-level coursework for those who are deemed unprepared for post-secondary coursework (Venezia & Hughes, 2013). In Florida, students have the option to waive remedial education altogether and immediately enter into on-level coursework (S.B. 1720, 2013). As a result of high school adoption of a broad scale standardized high school curriculum, Florida community colleges plan to shift the need for developmental education to non-traditional students and hope the implementation of the Common Core Standards in Florida public education will minimize the need to remediate traditional students (Moltz, 2010). With policy change came program change as well. Park, Tandberg, Hu, & Hankerson (2016) found about two-thirds of Florida community colleges needed substantial changes to accommodate the removal of placement testing, all the while providing developmental assistance for students who choose to enroll in remedial education. While early in its implementation, Park, Woods, Richard, Tandberg, Hu, & Jones (2016) established students were more apt to either enroll in on-level courses or not enroll in any math or reading entirely, thus delaying their English and math requirements. Hu et al. (2016) discovered developmental pass rates increased, while gateway course pass rates decreased across the Florida College System.

Developmental Bridge Programs. The summer transition time for college-bound students can be one of opportunity for the student to get an early start on coursework and for the institution to onboard and connect with incoming cohorts. In an effort to accelerate students through remedial courses at the beginning of their academic career, institutions have created programs for students to better position themselves for the fall semester by completing developmental requisites during the prior summer term (Bettinger et al., 2013). Typically referred as a summer bridge program, Wathington, Pretlow, and Barnett (2016) regarded the design of these programs to offer students early access to remedial topics and engage in non-cognitive skills that could potentially aid the student in navigating the post-secondary education environment. The implementation of these programs comes in different forms, which Mitchell, Alozie, and Wathington (2015) described as "workshops, classroom instruction, tutoring, and mentoring" (p. 367). Several types of bridge offerings are listed below with a description of how the program is implemented, along with research findings associated with the summer bridge programs.

Creating Higher Expectations for Educational Readiness (CHEER). The CHEER program utilizes developmental best practices within its setup and implementation (Bir & Myrick, 2015). The program is provided to first-time, full-time students during the second summer session prior to their initial fall term and provides entering English and math courses (Bir & Myrick 2015). Created at an HBCU, this study provides results for underserved populations. Bir and Myrick (2015) found positive gains with this program and noted "Overall findings demonstrate that CHEER makes a difference to all students, male and female" (p. 26). While not distinctly offered for developmental students, enrollees in the program had significantly lower high school grade point averages and SAT scores, relative to their entering

counterparts. Given this program's use at an HBCU, this study provides relevance for underserved populations.

Integrated Basic Education and Skills Training (I-BEST). Listed by the U.S. department of education as a bridge model (U.S. Department of Education, 2011), the I-BEST program blends basic and technical courses for students who are not yet ready for on-level coursework (Bailey & Cho, 2010). For the Maricopa Community College District, I-BEST is utilized for potential GED earners and provides career instruction, allowing students to take the first step in the pathway to an associate's degree (Coleman, 2016). In the state of Washington, I-BEST programs directly link unprepared students with college-preparatory courses that are woven into certificate programs designed to provide the student with an employable credential (Wachen, Jenkins, & Noy, 2011). The essence of the program is to provide students who otherwise do not have the financial capability to complete, the opportunity to finish both remedial coursework and program-specific coursework together (Bailey & Cho, 2010). Washington, Wachen, et al. (2011), established students who enroll in the I-BEST program were more likely to complete credits in the first semester. In addition, enrollees were more likely to complete a certificate (Bailey & Cho, 2010).

In addition to positive gains, drawbacks to the program are evident. Challenges with the cost of the program and whether appropriate curricular content is provided contests the effectiveness to transition the student to on-level coursework within I-BEST programs (Mangan, 2014). These areas of concern increase the potential of placing false barriers to success for students.

Texas-based summer bridge program. Two studies have been conducted which research the relevance and effectiveness of bridge programs in Texas. These programs utilize

two implementations, one for credit-bearing courses and one as a preparatory program to retake the placement test upon completion (Wathington et al., 2016). Mitchel et al. (2015) found that while students were prepared in the short-term, long-term successes were minimal as students struggled with their transition of expectations from two-year to four-year institutions. Wathington et al. (2016) discovered similar findings and noted "the effects of the program diminished over time" (p. 171). In addition, Wathington et al. (2016) found little difference in the total number of credits earned, as well as persistence. In summary, immediate gains in effectiveness were observed, while sustainable impacts were unfounded.

Learning Communities. Using a cohort model, creating a core set of courses for enrollment, engaging students in non-cognitive activities, and having faculty leads for the cohort make up one implementation of the method of learning communities (Booth, Capraro, Capraro, Chaudhuri, Dyer, & Marchbanks, 2014). Weiss, Visher, Weissman, and Wathington (2015) noted a continuum of the use of learning communities, ranging from multiple courses for which students take as a cohort, to an integrated model with wrap-around student supports which supplement intra-curricular concepts. Regardless of implementation, the model of learning communities entails a group of students who take courses together, situated within an academic theme (Weiss et al., 2015). As for evidence of the effectiveness of these programs, Bailey & Cho (2010) noted, "more comprehensive [learning communities] led to positive impacts on student engagement, college persistence, credits earned, and developmental course sequence completion in English" (p. 6).

Given the criteria of a defined cohort, entering developmental students provide a natural grouping for a learning community. With the theme of project-based learning (PBL) and service learning, Butler and Christofili (2014) reported an increase in student motivation and

accomplishment in specified program outcomes for first generation developmental students. Bettinger et al. (2013) discussed similar findings as learning communities may increase engagement and strengthen peer groups within the classroom. Further, Baker, Edgecombe, & Silverstein (2011) found moderate success in a learning community that intertwined compressed developmental courses, wrap-around support, and case management. Significant short-term effects were realized, however longitudinal progress was noted as an area of further study (Baker, Edgecombe, & Silverstein, 2011).

The model of learning communities quickly gets blurred with other terms that tend to imply cohort-based methodologies, such as first-year experiences and fast-track developmental offerings (Hatch & Bohlig, 2015). These practices provide opportunity for deeper learning, a key ingredient to sustained success in higher education (Kuh, 2008). However, more research is needed to help define the differences and effectiveness of learning communities and those alike (Hatch & Bohlig, 2015).

Modularized Offerings. Given the lackluster effectiveness of developmental programs, the need for innovative offerings is profoundly needed to promote success among academically unprepared students (Edgecombe, 2011; Xu, 2016). For developmental math, two state systems revamped their programs to address multi-semester developmental sequences that contained content irrelevant to many programs for which students were enrolled (Edgecombe, 2016). Quantified as modularization, this platform of change is geared toward the identification of deficiencies via a diagnostic exam which ultimately prescribes a customized set of modules developmental students must pass to become on-level (Bickerstaff et al., 2016). Essentially, developmental students will remediate content the initial placement test flagged as being below college-level, for which students enroll in courses that pertain only to the noted content. These

courses are typically offered via computer, which Zavarella and Ignash (2009) noted as "fast becoming an integral part of higher education" (p. 2). Couched within the boundaries of an acceleration method (Edgecombe, 2011), the goal of the redesign was to provide students a shorter pathway to on-level coursework by eliminating content they are proficient at and focusing on content that needs to be remediated. As a result, more students entered into on-level coursework post redesign with a higher completion rate (Kalamkarian, Raufman, & Edgecombe, 2015). While these data provide support for the redesign, the initial diagnostic test has a lower threshold than the pre-redesign instrument, thus increasing the likelihood more students would place on-level. As for increased completion rates in on-level courses, lowering the threshold for on-level placement allows for students who are on the cusp of being on-level with the previous placement test the opportunity to go into their on-level course. As Bailey et al. (2010) alluded to, developmental placement does not necessarily imply the student should be in developmental education. Hodara and Jaggars (2014) echoed this sentiment and noted, "students just below a given course placement cutoff do not benefit from additional developmental coursework" (p. 248). Allowing more students at the top of the developmental spectrum the opportunity to enroll in on-level coursework may increase the completion rates and give the illusion the redesign was impactful, when in fact, it could implicate the previous placement test had too high of a placement threshold (Kalamkarian et al., 2015).

The use of subdivided curricula expands across the United States. In addition to modular approaches in North Carolina and Virginia, Minnesota also has a developmental approach with a similar implementation design. While vague, one community college in Minnesota claims a successful change to its developmental program by way of modularized course offerings (Consider these ideas to improve developmental education, 2012).

Compressed Courses. While the outcomes for compressed courses and acceleration are similar, compressed courses refers to, as Cafarella (2016) noted, "the condensing of content which results in less course work" (p. 12). To accomplish this, faculty and administrators focused on stop-out and drop-out points within traditional sequenced developmental courses, as well as essential concepts needed for success post-developmental offerings (Venezia & Hughes, 2013). Eliminating potential exit points could reduce the number of non-academic circumstances, of which, pose threats to student persistence and retention (Jaggars et al., 2015). The Community College of Denver, which compressed four sequenced math courses into two, realized higher rates of completion (Bettinger et al., 2013). Community colleges in Texas blended reading and writing to create the Integrated Reading and Writing program (Texas Higher Education Coordinating Board, 2014). For California and other states like North Carolina and Virginia, the condensing of remedial material was built out of the notion that all students do not need the same amount of remediation. Students who are liberal arts-bound do not need the same sequence of remediation a STEM-bound student needs. Hern and Snell (2014) denoted alternative prerequisites as a pathways approach and found substantial increases in the completion rates of on-level math courses for students who participated in the compressed offerings.

Software also plays into a school's capability to compress classes. Utilizing platforms which contain volumes of problem sets, South Texas College was able to compress a sequence of three developmental offerings down to two, realizing higher rates of success (Cafarella, 2016). In addition to the compressing of content and technological implementation, (Edgecombe et al., 2013) discussed ancillary benefits of compression to be the development of a cohesive cohort, likening it to a fast-paced learning community.

Supplemental Instruction (SI). While fluid in implementation, Phelps and Evans (2006) quantified SI as additional supports designed to provide assistance outside of academically challenging courses. Made up of student leaders, faculty, and other support staff (tutoring, learning assistance, etc.), SI provides a wrap-around approach to aid the student with academic difficulties (Burgan, 2008). Supplemental instruction has shown encouraging gains with underserved groups, as Phelps and Evans (2006) noted, "SI has proven to have a positive effect on special populations, such as developmental and minority students" (p. 24). Other outcomes associated with SI reflect gains in retention, completion, and overall higher academic success (Congos & Mack, 2005). Social interaction by way of peer instruction has also been correlated to higher academic outcomes (Maxwell, 1998).

Two community colleges have excelled in the use of SI. These colleges built programs and are models for the training of SI leaders and implementation within the developmental classroom (Phelps & Evans, 2006). Given the expansive nature of how SI is implemented on campuses, as well as how students, faculty, and staff facilitate the program, much research remains to determine the effectiveness and generalizability of supplemental instruction (Burgan, 2008).

Modes of delivering SI have also evolved over the past several years. Jacobs, Stone, and Stout (2006) discussed the use of supplemental instruction broadcast via video feed, as well as models that expand the use of SI to include teacher development. The latter, a broad scale approach was incorporated at a community college in Florida that blended learning communities with supplemental instruction and found substantial results in success rates across many underserved populations (Finney & Stoel, 2010). The framework for this implementation

required extensive cooperation, commitment, and training for both faculty and staff in order to provide the necessary supports for student learning (Finney & Stoel, 2010).

Co-requisite Offerings. The co-requisite model is a form of developmental acceleration, allowing students who are at the cusp of being on-level the opportunity to enroll in their gateway course, along with another course designed to provide on-time remediation (Adams et al., 2009; Edgecombe, 2011). Also termed as mainstreaming, this platform reduces redundancy between developmental and on-level curricula to allow for a shorter time to completion of developmental coursework (Walker, 2015). Acceleration provides a pathway that reduces the developmental sequencing students face, which could be a discouraging element to students, a phenomenon Hodara and Jaggars (2014) attributed to subpar performance in developmental education. One of the primary outcomes of the co-requisite model intends to improve the gaps between student knowledge and entry-level academic expectations within the post-secondary environment (Walker, 2015). The college examined in this study utilized the Accelerated Learning Program (ALP) approach from the Community College of Baltimore County (CCBC), which Bailey and Cho (2010) described as:

> …students placed into upper- level developmental courses are 'mainstreamed' into college-level courses in that subject, and are simultaneously enrolled in a companion ALP course (taught by the same instructor) that meets in the class period immediately following the college-level class. (p. 4)

Further, Bailey and Cho (2010) noted the goal of the program is to provide small groups of developmental students the opportunity for success in completing their developmental pre-requisites quicker. The focus for success, regarding this program, is the timing and instruction provided in the structured course that partners with the gateway course. This is a relatively new

area of research. Hodara and Jaggars (2014), noted "there has been limited empirical research on the effects of accelerating students' progression through their developmental requirements" (p. 247). Specific to the ALP, Adams et al. (2009) reported the co-requisite, or mainstreaming, model has been around since the 1990's, however, CCBC began with a pilot version of the ALP in 2007.

Unique to the co-requisite model, the ALP structures content around providing supplementary help by way of additional time to discuss assignments in the on-level course (such as drafts of papers within the English gateway course), intentional instruction on fundamental concepts needed for success in the gateway course, and opportunities for instructors to provide general college success strategies (Edgecombe, Cormier, Bickerstaff, & Barragan, 2013). In addition, the ALP component course restricts enrollment to provide small group instruction intended to reinforce concepts of the on-level course (Jaggars, Hodara, & Cho, 2015). Given the consolidation of developmental coursework and on-level coursework, Hodara and Jaggars (2014) noted the potential for success of the co-requisite model due to the reduction of exit points within the developmental sequence as well as the opportunity for under-placed students (resulting from a poor placement test performance) to enroll in gateway courses. Specific to placement testing, Venezia and Hughes (2013) discussed a weak correlation between initial placement tests and appropriate direction given to students, thus promoting errant alignment between student remedial needs and on-level ability. Evidence of success with the ALP model exists in both completion rates for students enrolling in ALP courses (versus a traditional developmental group) as well as cost savings for the same comparison groups (Adams et al., 2009; Bailey & Cho, 2010).

The amount of time students spend in developmental programs has spread to the political and system (or state) level. Venezia and Hughes (2013) noted, "Many educators, education leaders, and policymakers now view developmental education, as it has traditionally been organized and taught, as an obstacle to student success rather than as a support" (p. 38). The Virginia Community College System comprises twenty-three community colleges across the state and recently redesigned both developmental English and math to include the ALP (Edgecombe, 2016). In the spring semesters of 2012 (math redesign) and 2013 (English redesign), the implementation of the redesigns began, which significantly reduced the old curricula, implemented modularized developmental offerings in math, reduced exit points for students, and implemented an ALP model in English (Bickerstaff, Faye, Trimble, 2016; Edgecombe, 2016). Acceleration is evident in this process by the decreased amount of remediation students must complete in order to get to their gateway course.

The California Acceleration Project (CAP) is another accelerated platform that utilizes mainstreaming to reduce exit points and explore other curricular reform designed to reduce redundancy and expedite the developmental pathway (Edgecombe et al., 2013). As with the ALP, this approach is fairly recent, beginning in 2010 and focuses on innovative ways to increase retention across developmentally-placed students (Hern & Snell, 2014). As with the ALP model, completion of on-level English courses for the CAP are higher than students who enroll in the traditional developmental pathway (Hern & Snell, 2014).

Conclusion

Developmental education is in need of innovative approaches and appropriate solutions conducive to promoting student success. However, current treatments to remediate only provide success for around half of the students enrolled in these courses (Gallard, Albritton, & Morgan,

2010). Traditional sequencing pathways can take as many as five semesters to complete, doubling the amount of time a student would typically plan to complete a two-year degree (Crisp & Delgado, 2014). Difficulties facing institutions are not isolated, nor are they unique. Placement testing directs the majority of students nationwide to developmental courses at the cost of thousands to the student and billions to the institutions and taxpayers (Bettinger, Boatman, & Long, 2013; Quarles & Davis, 2017; Wathington, Pretlow, & Barnett, 2016). Appropriate placement is essential to limiting the amount of time allocated and tuition paid for courses which typically carry no credit value towards a degree (Ngo & Kwon, 2015). Further, the developmental pathway students must navigate to become on-level warrants alternatives as the percentage of students drastically decreases as the number of required remedial courses increases (Fike, 2009).

To mitigate these obstacles, institutions are moving towards accelerated models of developmental education, however, limited research has been conducted on the effectiveness of these approaches (Hodara & Jaggars, 2014). This gap in the current body of knowledge provides the grounds for which this study was built upon. Examining student success and withdrawal rates for both gateway and subsequent courses contributes to the existing body of knowledge by way of providing a longitudinal analysis of students receiving an accelerated approach. This was accomplished by using students who enrolled in a traditional developmental sequence and on-level placed students as controls. The intent was to deepen the current research around accelerated approaches which utilize the co-requisite model.

CHAPTER III

METHODOLOGY

The methodology described in this chapter follows a chronological path from start to finish. The research design and context is be presented, followed by the participants and instruments used to collect the data. After these components are addressed, the data collection and analysis is described. To complete this chapter, limitations are discussed, along with a conclusion.

Purpose Statement

The purpose of this study was to evaluate the Accelerated Learning Program (ALP) offerings at a small rural community college in Virginia. Utilizing a quantitative foundation, retrospective data were gathered and three groups of students were created. Placement in the groups was determined by their results on an initial placement instrument and subsequent enrollment actions (on-level placement, developmental placement without ALP, developmental placement with ALP). Since the placement test determines the students' pathway, a random control and treatment group was not feasible, thus the design was quasi-experimental. A comparative analysis determined whether significant differences existed between each group to determine if students receiving the co-requisite model succeeded at the same rate as the other two groups. This study provides support in the way of assessing the effectiveness of the ALP, thus contributing to an area where little evaluation has taken place.

Research Questions

The following research questions guided the study:

1) Do significant grade differences in math exist between developmental students, ALP students, and on-level students?

a. ALP students have a higher gateway math course GPA than developmental students.
b. ALP students have a higher gateway math course GPA than on-level students.
c. ALP students have a higher gateway math course completion rate than developmental students.
d. ALP students have a higher gateway math course completion rate than on-level students.
e. ALP students have a higher subsequent math course GPA than developmental students.
f. ALP students have a higher subsequent math course GPA than on-level students.
g. ALP students have a higher subsequent math course completion rate than developmental students.
h. ALP students have a higher subsequent math course completion rate than on-level students.

2) Do significant grade differences in English exist between developmental students, ALP students, and on-level students?
    a. ALP students have a higher gateway English course GPA than developmental students.
    b. ALP students have a higher gateway English course GPA than on-level students.
    c. ALP students have a higher gateway English course completion rate than development students.
    d. ALP students have a higher gateway English course completion rate than on-level students.

e. ALP students have a higher subsequent English course GPA than developmental students.
f. ALP students have a higher subsequent English course GPA than on-level students.
g. ALP students have a higher subsequent English course completion rate than developmental students.
h. ALP students have a higher subsequent English course completion rate than on-level students.

Research Design

To address these questions, a quantitative design utilizing existing data on course grades, as well as students who withdraw, was performed. Based on placement test information, developmental students enrolled in gateway English and math courses and self-select their remedial pathway by completing all developmental pre-requisites or choosing to enroll in an accelerated course before finishing all developmental course work. Students meeting all criteria for the specified performance benchmarks on the placement exam were directly placed on-level without developmental requirements. With these stipulations, this study was a quasi-experimental, ex-post facto design given the lack of a random control or experimental group.

A quantitative study was most suited for this research as prior descriptive data were gathered in order to follow students from their gateway course through their subsequent English or math course. Utilizing course grades and withdrawals allowed for a uniform approach to the data pull and processing of results, thus enhancing the reliability of the study by way of making it easier to replicate. In addition, it fosters a strong external validity, as course grades are a

common practice across institutions in higher education, which increases the generalizability of the findings.

A quasi-experimental approach was used due to the removal of the randomized control element. The initial assessment mechanism was a placement test that determined whether the student was on-level or required remedial education. Two pathways were derived from the placement test; On-level and Developmental. The treatment for this research was an optional route developmental students opted to take to expedite their remedial work. Denoted in Figure 1 as "Accelerated Pathway," students may opt to take this pathway to forego a semester of only developmental courses and co-enroll in both their on-level and developmental course. Figure 1 also shows students who did not choose this option and completed all developmental coursework prior to taking their on-level course, thus creating a non-random control. A second control is also in place due to the students who received an on-level placement resulting from the placement test. All pathways are represented in the gateway English and math courses and, as this study lent support to, should be at the same academic level upon completion of the gateway course. As a result, there are no developmental or accelerated needs in between the gateway and subsequent English and math courses. All data were retrieved in an ex-post facto format coming from academic years 2010-11 through 2016-17 and contained course grades, along with the number of withdrawals for each of the three identified groups (developmental only, developmental accelerated, and on-level). Existing data were utilized in this study to allow time for students to progress through their subsequent course which allows for a longitudinal analysis of performance over the span of both the gateway and subsequent English and math courses.

This research design aids in addressing the effectiveness of the accelerated model for both English and math remedial courses. Given there has not been an evaluation of the

accelerated program for either English or math, the findings from this study provide relevant information and support to determine whether students benefit from this type of acceleration. Furthermore, the Virginia Community College System (VCCS) is adopting the acceleration platform across all community colleges within the state and can learn from these data to ensure an appropriate alignment between student needs and the efficient use of institutional resources.

Figure 1. Pathways for Developmental, Accelerated, and On-Level Students

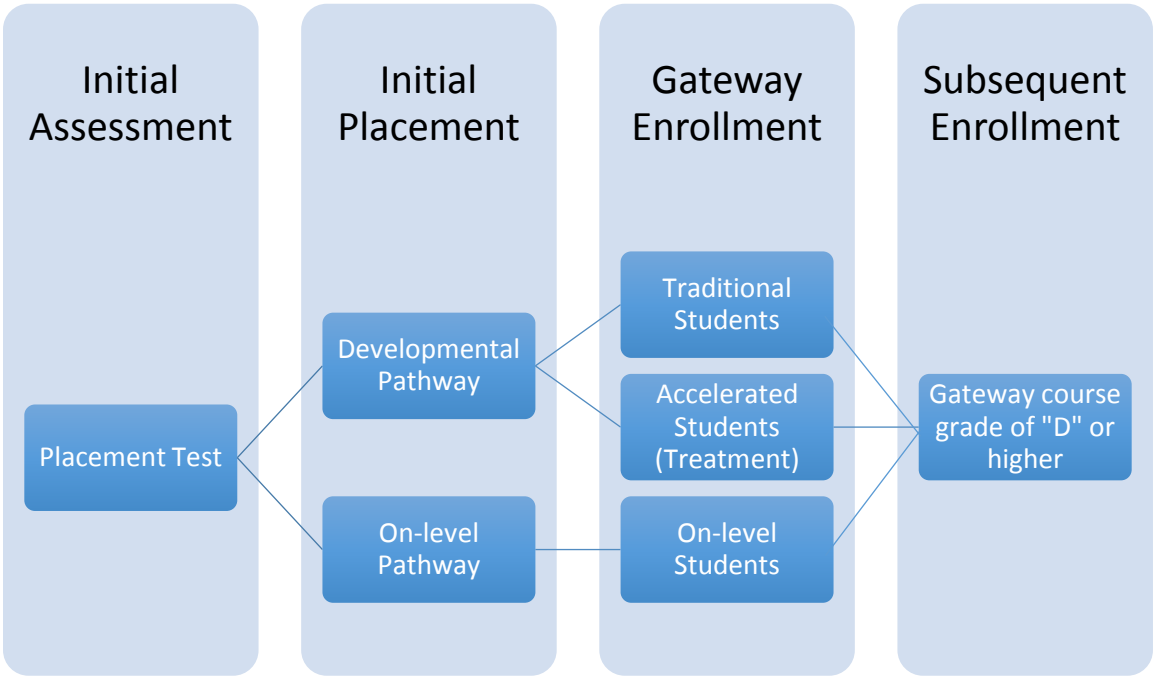

Figure 1. Flow chart depicting the pathways students follow in order to enroll in gateway English and math courses. Pathways are determined by results on the initial placement test.

Setting

This study took place at a small rural community college in Southside Virginia. Its fall FTE is around 1,700 with a headcount close to 2,500 (U.S. Department of Education [USDOE],

2017). After state-mandated and faculty-driven redesigns in 2012 (math) and 2013 (English), the college implemented modularized developmental math and an accelerated form of developmental English. Prior to the redesign, developmental acceleration in both English and math were offered in the form of a co-requisite developmental course with the on-level course. Through the transition in developmental math, the accelerated approach remained and is currently the only community college in Virginia that offers the ALP for both English and math courses. As the statewide developmental English redesign adopted the accelerated approach, only the course offerings for developmental English changed.

Through two redesigns, the accelerated model at this institution remained. The model this institution originally adopted from the Community College of Baltimore County (CCBC) for developmental English was embedded into the statewide developmental English redesign (Adams, et al., 2009). Further, this institution adapted the CCBC English model of developmental acceleration for developmental math. What has not happened since the implementation is a formal evaluation that provides support regarding the effectiveness of the program. The selection of this institution for this study is due to the personnel's experience with developmental acceleration, the lack of an evaluation, and offering of the Accelerated Learning Program for both English and math. There is also an opportunity to provide research findings to a much broader group, being the system for which this institution is a part of, as well as other colleges implementing or piloting similar programs that wish to take developmental acceleration across subject areas (e.g. from English to math) or to scale.

Context. Student success is always a viable goal for any program within higher education. Changes to curricula, pedagogical techniques, and educational processes occur frequently on campuses nationwide. For the college in the current study, the implementation of

the ALP affected all of these areas. For any change that takes place, administrators and faculty need to take note of the impact it has on student success. This institution has numerous anecdotal accounts of student success, yet no formal review of the impact on students. In short, no formal inferences regarding the effectiveness of the ALP exist. Aligned with student success from a quantitative context, this study analyzed course grades to derive a completion rate and non-completion rate for each group of students. To complement these rates, course GPA for both subject, as well as gateway and subsequent sections were calculated. These groups were compared to each other in both the gateway and subsequent courses to determine if students in the accelerated pathway succeed at the same rate as the other two groups.

Variables. Upon entry into the college, students completed an initial placement test. Two outcomes (developmental placement or on-level placement) resulted from this assessment and were dependent on the test. From the placement test, three independent variables occurred. These variables served as the constructs that contained both control variables (developmental only courses that led to the gateway course and on-level placement led to the gateway course) and the experimental variable (development with acceleration course that was taken at the same time as the on-level course). Once students enrolled in the gateway course, dependent variables existed for the course grade or withdrawal, whichever the student received. The same applied for the subsequent course. In summation, each group of students had their own independent variable for which the dependent variable was course grade (or withdrawal). For on-level students, the independent variable was the placement test. For developmental-only students, the independent variable was the completion of their developmental courses and for developmental acceleration students, it was their co-requisite course. Both the gateway and subsequent courses served as control variables.

To control for other independent variables, descriptive statistics were gathered for all three subgroups (developmental, ALP, and on-level). Specifically, age, race, gender, and Pell status were utilized for each subgroup and then compared using a T-test measurement. Based on the results of the T-test, subgroups were calibrated to control for the aforementioned variables.

Data Accessibility. A request for data was submitted following approval by the Human Subjects Committee (see Appendix) of the College of Education at Old Dominion University (ODU). Once ODU granted permission to research, the selected institution reviewed the request to conduct research. As this study utilized no identifiable information, did not conduct any interviews, and had no perceived threat to the institution or students, permission to research at the institution was granted. In addition, preliminary approval was granted from the institution's Vice President for Academic Student Development Services, noting the importance of this evaluation to the college.

Participants

Participants for this study came from the student body population of the college at which the study was conducted. The makeup of the student population was 51% full-time, 61% female, 68% white, and 69% traditional age (USDOE, 2017). Students enrolled between 2010-11 and 2016-17, earned at least a "D" in their gateway course, and either completed or withdrew from two English and two math courses had course grade data analyzed for the gateway English and math course, as well as the subsequent English and math course.

Sampling. A stratified sampling procedure was utilized for this study. The ALP has been in place at this institution since 2009, allowing for strata to be defined by academic years. Given the timeframe to complete both gateway and subsequent courses, 2016-17 caps the range of data that were collected. What is unique about this data collection was all students who met

the criteria had grade and withdrawal data utilized in this study. There was no random sampling of the data as the number of students completing or withdrawing from either the gateway or subsequent course were collected without causing major delays in the processing of the results.

Based off of data internal to the institution, around 60% of students entering the institution required remedial work. Class sizes for English and math were around 25 students, therefore 60% of this class, or 15 students, came from the developmental pathway. Each ALP course was split into two enrollments, the first being an on-level side for students who tested on-level after taking the placement test and students who completed all developmental pre-requisites without taking an ALP. The second part of the course enrollment was open only to those who qualified for the ALP. For the ALP side, enrollment was usually capped at ten, leaving fifteen slots for on-level students. Given 60% of the 25 slots should come from developmental students and 10 of those slots were reserved for ALP students (nine was assumed for this study), this equates to the above numbers for each student type. In total, approximately three-hundred students were expected for the gateway course for this study. Local data show approximately a sixty-four percent gateway completion rate, therefore an estimate for the size of the subsequent group throughout both academic years was projected to be around two-hundred students.

Students who typically plan to complete a gateway and subsequent English or math sequence intend to transfer to a four-year institution as this is a common requirement of transfer programs within the Virginia Community College System (VCCS). Non-transfer programs usually contain one math, however, many do contain two English courses. As a result, English data reflect non-transfer students in addition to their transfer counterparts. Certificate credentials represent programs of study from 30 to 49 credits and Career Studies Certificates are between 8

and 29 credits. Both of these types of credentials do not include a sequence of English or math, therefore the majority of student data were representative of two-year credential-seekers.

Instrumentation

The data for this study were collected from a database utilized by all colleges within the VCCS. Oracle's PeopleSoft software is a data warehouse containing all student information. Specific for this study, all student grades were retrieved from PeopleSoft and processed in Microsoft Excel. In order to gather student grades, a query was built within PeopleSoft to pull course grades for the specific courses and academic years. The output of the query opened in Excel and allowed for the analysis to take place.

All student information was uploaded into this system and made for an efficient retrieval process for student data. Using PeopleSoft, it also increased the external validity of the data gathering process as PeopleSoft is a common software used across many institutions in higher education, thus allowing for generalizability from institution to institution. In addition to the external validity, internal validity was also high due to the creation of the query that allowed for the data retrieval process to be repeated exactly as was done for this study. From a reliability perspective, the use of PeopleSoft was justified.

Data Collection Procedures

Once approval from the Human Subject Committee was received, the data collection began. Given this study was quantitative and utilized retrospective data, the collection was not dependent upon any phenomenon happening in the present. This allowed for the entire data pull to happen at once and for the processing of data to immediately follow the extraction.

The collection took place during the summer of 2017 at the community college for which this ALP was implemented. Using a secure, networked computer, the PeopleSoft data

warehouse for the Virginia Community College System (VCCS) was accessed to build a query that pulled student grades for ALP courses and subsequent courses. All queries in PeopleSoft were built from records. These records are comprehensive files that are continually updated and loaded by each college and stored in PeopleSoft. The researcher began the ALP query by utilizing the enrollment record for all years of the study: 2010-11 through 2016-17. In addition to the academic year, or term, each record contained numerous reporting points, or outputs. Each output also served as a filter. While the academic years served as an output in the data collection (to determine which academic year the student enrolled in an ALP course), it also served as a filter to prevent all other academic years from being pulled. The enrollment record also filtered for credit students (as all ALP courses are for credit), the specific community college, and subject (all ALP courses either began with "ENG" or "MTH"). Filters served as an efficiency factor to lessen the number of data values pulled during the query.

The outputs for the data collection were the EMPLID (student identifier), term (academic years listed above), subject ("ENG" and "MTH"), catalog number (value associated with the subject), section (served as the key to determine which courses are ALP), and official grade. The query generated an Excel file, as exemplified in Table 1. These data were filtered in Excel to only show gateway and subsequent course grade data. The subsequent course was the course listed in the program requirements and was sorted by term. In other words, the subsequent course must take place in a term after the gateway course was completed.

Table 1

Query of Grade Data

EMPLID	Term	Subject	Number	Section	Grade
1234567	2134	MTH	157	ALP01	C
2345678	2142	ENG	111	03	B

Note. The example provides a view of what the data collection looked like once the query was completed. The middle values of the term reference the year and the last digit represents the spring (2), summer (3), or fall (4), e.g. "2134" represents fall 2013. The "ALP" in the section value is the indicator for students enrolled in ALP courses.

A second query was conducted that provided students' placement and served as the sorting mechanism to develop the three types of students who enrolled in gateway English and math courses. The three types were on-level, developmental, and accelerated students. On-level students were students who, after completing the initial placement test, received a placement directly into the gateway course and were not required to complete any developmental pre-requisites. Students in the developmental and accelerated tracks were required to complete developmental coursework either before or with their gateway course. Once students completed their placement test, their results were recorded in the "Student Groups" panel within PeopleSoft, allowing for the sorting to take place.

Developmental English placement scores. For students who took their placement test prior to fall, 2013, the COMPASS test was used to place students in either developmental or on-level English. If students were placed developmental, they were required to complete a sequence of developmental English prior to enrolling in their on-level English course. Students who were

one course of developmental English from being on-level were given the option to take their developmental and on-level courses concurrently. This combination represented the ALP pathway. For students who took their placement test fall, 2013 and thereafter, the Virginia Placement Test was used to determine whether the student was developmental or on-level. Placement for English utilized a system based on the values of 1, 2, 3, and 4. Scores of 1 and 2 placed a student directly into developmental English with no option of acceleration. Once the student completed their developmental pre-requisites associated with a score of 1 or 2, the student went directly into their on-level English gateway course. If a student scored a "3," the student was automatically placed into the ALP English course. A student who scored a "4" was considered on-level and enrolled in the gateway English course.

Developmental math placement scores. Prior to spring, 2012, COMPASS was the placement instrument used. For students who were placed developmental, they would complete a sequenced pathway of developmental math courses. Students who lacked one math course had the option of enrolling in the ALP pathway. For students who took their placement test after spring, 2012, the Virginia Placement Test was used to determine developmental and on-level placement. The developmental math curriculum was separated into nine modules. There were three exit points based on the program of study. For non-transfer programs, students must either test out of the first three modules, or complete the first three modules to be considered on-level. Since most non-transfer programs did not require a subsequent course, this group of students was excluded from the study. Students who enrolled in programs typically associated with fields based in Liberal Arts (e.g. Communications, English, Psychology, Sociology, etc.) must either test out of the first five modules, or complete the first five modules to be considered on-level.

Science, Technology, Engineering, and Mathematics (STEM) programs required all nine modules as a pre-requisite for on-level placement.

Query identifiers. All placement test scores were housed in a "Student Groups" panel within PeopleSoft. This record was utilized in the second query for both English and math placement. Given the complex nature of math placement and program pathways, the rubric in Table 2 was used to sort the three types of students. It should be noted this rubric was only used for students enrolling in developmental courses after the math redesign was implemented. Prior to the redesign, all developmental requirements for programs were the same.

Table 2

Rubric for Sorting Students in Math Based on Placement Test Performance

Group	Liberal Arts Programs	STEM Programs
On-Level	CS Placement 1	CS Placement 1 and 2
ALP	3 out of 5 modules	7 out of 9 modules
Developmental	5 out of 5 modules	9 out of 9 modules

Note. "CS Placement 1" implies the student was proficient in the first five modules, whereas "CS Placement 2" implies the student was proficient in modules six through nine.

Final processing. Both queries were loaded into an Access database to create three cohorts that were studied. Based off of placement test scores from the second query and developmental completion in the first query, it was determined which type of student enrolled in each gateway course. The course grade was the dependent variable of each student within their respective group along with their subsequent course grade.

Data Analysis

The query process utilized for this study produced large amounts of raw data, which contained grade data for all courses taken across the academic years. To cull down the data and remove all data not applicable to this study, filters were used to separate gateway courses for which the ALP was offered, along with their subsequent course. By using the section number of the course, all gateway courses with an ALP option were identified for further analysis.

Once established, a deeper examination of grade data took place. The analysis portrayed two rates based off of two outcome categories, those who completed the course with a "C" or better (completion rate) and those who withdrew from a course (withdrawal rate). The filtered data contained the final grade for students, and for those who withdrew, a "W" was the grade on record. The data also categorized the type of student (on-level, ALP, and developmental). The completion and non-completion rates were recorded for each group, allowing for a comparison between each type. The collection of grade data also allowed for a subgroup GPA to be calculated, which was also used for comparison (e.g. on-level subgroup GPA compared to ALP subgroup GPA).

Each group had two rates. The completion rate represented the number of students who earned a "C" or better (numerator), divided by the total number of students enrolled in the gateway course. For courses that had multiple ALP sections, the completion rate was aggregated for all equivalent sections. The withdrawal rate represented the number of students who withdrew from the course (numerator), divided by all enrollees for the respective course. In addition to the withdraw rate, both "D" and "F" grades were also calculated in the same fashion. For GPA, the grade points for each subgroup were totaled and divided by the total number of credits taken.

The statistical analyses that were performed were confidence intervals and hypothesis tests. For all three groups, confidence intervals projected where the population mean was for course grade point average and the population proportion for the ratio of completions and withdrawals to all grades. To strengthen the analysis, a hypothesis test was performed on each of the three combinations of groups (e.g. Developmental Only and Developmental Acceleration, Developmental Only and On-level, and Developmental Acceleration and On-level) using a null hypothesis of course grade point average being the same and a significance level of $p < .05$. The same comparisons were used for the proportion of non-completions (D, F, and W grades) for which the null hypothesis was assumed the proportions were the same. These tests were performed across the gateway courses and subsequent courses in English and math.

The use of the confidence intervals and hypothesis test were to build a projection of the population value and determine intervals for each comparison group. If any of the group confidence intervals contained positive and negative bounds, it allowed for an inferential conclusion resulting in a plausible scenario where there was no difference between the compared groups (being zero is contained in the interval). The hypothesis test for the groups strengthened the results by way of determining whether the null comparison failed to be rejected (meaning it was plausible the null was equal), or could be rejected (the comparison groups were distinctly different). Determining what differences the groups had and whether they were significantly different enabled the researcher to make a claim regarding the groups in the study and ultimately provide support around the effectiveness of the ALP. All analyses were held at a 95% confidence level.

The use of inferential statistics for this study provided a deeper level of insight into the data than descriptive statistics. Confidence intervals and hypothesis testing both align well with

completion rates and non-completion rates. For confidence intervals, this test projects what a population proportion would be, which has meaning for and application with the groups in this study. The hypothesis test provided a claim to be tested, assuming all the groups were the same and returns a probability of the results happening by chance. Hypothesis testing provided a standardized assessment to compare the findings of the current study to other studies. All findings from these inferences are contained in a table denoting the margin of error, confidence intervals for all groups, and p-values for the hypothesis tests.

Limitations

The overarching approach for this study was quantitative. Results from this quantitative paradigm provided a direction as to the effectiveness of the ALP. However, the comparison of completion rates and non-completion rates only starts the conversation around on-level, ALP, and developmental students as the quantitative perspective does not always provide the richness that a qualitative study offers (Atieno, 2009). Therefore, this study, by way of methodology, limits the depth of insight that can be taken from these data.

Internal Threats. In order to promote repeatability, this study utilized a common system that houses data. However, for institutions that do not have PeopleSoft, building a query in a different system could lead to different results. In addition, all records in PeopleSoft were loaded in by the individual colleges, of which, minor policy and practice discrepancies can lead to different results from the query.

Specific to the outcomes of the study, course grades can be a highly subjective interpretation of effort, aptitude, and performance as the instructor is the evaluator of the student. The content of the courses can also vary from course to course, thus making it difficult to repeat

everything that happens in an ALP course. Withdrawal policies may also fluctuate from campus to campus, which would lessen the importance of the findings for withdrawal rates.

Given the different programmatic offerings to remediate students in developmental education, challenges may exist for institutions in other states to replicate the same programmatic characteristics within the developmental, accelerated, and on-level cohorts. Developmental math in Virginia is modularized and while this is standard across all twenty-three Virginia community colleges, it may not be the same platform for developmental education in another state. In addition, the content for the ALP component course (the co-requisite developmental course) is malleable as its essence is on-time remediation. Students will have different struggles from class to class and will require different content areas to remediate. Replication in this sense would be providing a platform of on-time remediation, as anything more specific would be remiss.

The initial sorting mechanism that was used in this study is also an area of constraint. The student data were pulled across two different placement tests: COMPASS and the Virginia Placement Test (VPT). The VPT was created for and tailored to the redesign of the VCCS developmental math redesign (transition to modularization). The applicability of this screening test may not be suitable for other states, as its objectives may not align with other developmental curricula.

In addition to the change in placement tests, a change to the math curriculum also transpired over the span of these data. Prior to 2012, developmental math was taken as a semester-long course, whereas 2012 and thereafter, a modularized approach was implemented. While much of the remediated content remained the same, students who received the modularized content completed work that was more specified to their areas of weakness.

External Threats. The ability to generalize findings was limited due to the uniqueness of the ALP. The use of acceleration was used across developmental programs, however "acceleration" is loosely defined across a variety of implementations (Jaggars, Hodara, Cho, & Xu, 2015). Therefore, results from one developmental acceleration practice may not generalize to another due to the differences in the implementation of an accelerated approach.

The subjectivity of threshold scores also limits generalizability. As seen in the VCCS, the math redesign brought an influx of students into on-level gateway courses (Kalamkarian et al., 2015). This was not due to an increase in aptitude, rather, a lowering of the placement threshold for entry into gateway courses (Kalamkarian et al., 2015). As other states and institutions may have different thresholds for their developmental programs, generalizing the results may be limited as a student who placed developmental and chose acceleration in Virginia may have placed on-level at another institution outside of Virginia.

The socioeconomic status of students could impact the generalizability of results. While the effect of financial aid may be hard to quantify for the sake of this study, the change in the awarding of summer Pell Grants, which started in the summer of 2013, should be noted as a limitation (Brown, 2013). The removal of awarding financial assistance to students during the summer semester could impact those of lower socioeconomic status by way of enrollment actions. If financial constraints are a factor to enroll, a student may defer to a semester for which financial assistance is available, such as the fall or spring semesters. Having a scenario that could potentially change the enrollment actions of students may present itself as a threat to cohorts in this study. In the case of Pell Grants, a significant enrollment decrease due to lack of tuition funds could occur in the summer, thus creating an effect on completion. For every

enrollment period that is missed (e.g. foregoing a summer semester that is not funded by Pell) an opportunity for stop out exists, negatively impacting retention and completion.

This study utilized a descriptive cohort analysis. Four factors were analyzed to determine if the subgroups (ALP, developmental, and on-level) were comparable. One of the descriptive factors was Pell status. Determining Pell eligible students was not an indicator available for the three cohorts, thus only Pell received was measured. These data encompassed all students who applied for Pell and received anywhere from no award to the maximum. Students who did not apply for Pell were not a part of the study.

Course grade data were aggregated at the course level. No specific course was analyzed, as this study did not evaluate an instructor's class, rather this study provides an inferential analysis on student performance in three separate groups within gateway English and math courses, regardless of what gateway or subsequent English or math course that may be. Withdrawal data were treated the same. A constraint of the system, for which data were extracted, was the inability to provide the date of withdrawal for the student (semester only). The only indicator for a student who withdrawals from the course was the use of a "W" grade in their course grade history.

As for sampling limitations, the majority of students were placed into developmental education upon completion of the initial placement exam. The population of this school is approximately 69% white and 31% minority. The minority group was predominately made up of black and Hispanic students. In addition to ethnicity, the majority of students are traditional in age (less than 25 years old), female, and receive a Pell award. Demographics vary from school to school, thus creating an opportunity for any differences in age, ethnicity, gender, and Pell status to impact the results if this study were to be replicated.

Conclusion

This study was couched in a quantitative paradigm utilizing inferential statistics to quantify all findings. Three groups of students were analyzed in both gateway and subsequent courses in English and math as sorted by their performance on the placement test, completed upon entry into the institution. Completion rates marked one outcome to determine whether students were succeeding at the same rate among the three groups. A non-completion outcome also measured withdrawal rates, "D," and "F" grades across the three groups. Findings for these outcomes provided support regarding preparedness for gateway and subsequent courses. A deeper look into the success of students across all three groups was also provided by way of course GPA. Calculating an overall grade average for each subgroup provided an analysis that was different from the binary approach, such as completion and non-completion rates, and delivered information within a range. Thus, between group comparisons across these measures not only gave insight into the success of each group on whether they completed or not, but to what extent each group succeeded in their gateway and subsequent courses of English and math. Overall, an initial comparison was provided through their gateway performance, which was then coupled with their subsequent performance to entail a longitudinal view.

CHAPTER IV

RESULTS

This chapter provides the results of the research questions for the study. The purpose of this study was to evaluate the Accelerated Learning Program (ALP) offerings at a small rural community college in Virginia. Utilizing a quantitative foundation, retrospective data were gathered and three groups of students were created. Group assignment was determined by the student's results on the initial placement instrument and subsequent enrollment actions (on-level placement, developmental placement without ALP, developmental placement with ALP). Since the placement instrument determines the students' pathway, a random control and treatment group was not feasible, thus the design was quasi-experimental. A comparative analysis examined whether significant differences existed between each group to determine if students who received the co-requisite model succeeded at the same rate as the other two groups. This study provided support in the way of assessing the effectiveness of the ALP, thus contributing to an area where little evaluation has taken place.

Research Questions

Two research questions guided the study:

1) Do significant grade differences in math exist between developmental students, ALP students, and on-level students?
    a. ALP students have a higher gateway math course GPA than developmental students.
    b. ALP students have a higher gateway math course GPA than on-level students.
    c. ALP students have a higher gateway math course completion rate than developmental students.

d. ALP students have a higher gateway math course completion rate than on-level students.
e. ALP students have a higher subsequent math course GPA than developmental students.
f. ALP students have a higher subsequent math course GPA than on-level students.
g. ALP students have a higher subsequent math course completion rate than developmental students.
h. ALP students have a higher subsequent math course completion rate than on-level students.

2) Do significant grade differences in English exist between developmental students, ALP students, and on-level students?
    a. ALP students have a higher gateway English course GPA than developmental students.
    b. ALP students have a higher gateway English course GPA than on-level students.
    c. ALP students have a higher gateway English course completion rate than development students.
    d. ALP students have a higher gateway English course completion rate than on-level students.
    e. ALP students have a higher subsequent English course GPA than developmental students.
    f. ALP students have a higher subsequent English course GPA than on-level students.

g. ALP students have a higher subsequent English course completion rate than developmental students.
h. ALP students have a higher subsequent English course completion rate than on-level students.

Data Collection

A secured, networked computer was used to access the PeopleSoft data warehouse for the Virginia Community College System (VCCS) which was utilized to query student grades for ALP courses and subsequent courses. All queries in PeopleSoft were built from records. These records were comprehensive files that were continually updated and loaded by each college and stored in PeopleSoft. Enrollment records were pulled for the academic years of 2010-11 through 2016-17. In addition to the academic year, or term, each record contained numerous reporting points. Each output also served as a filter. While the academic years served as an output in the data collection (to determine which academic year the student enrolled in an ALP course), it also served as a filter to prevent all other academic years from being pulled. The enrollment record filtered for credit students (as all ALP courses are for credit), the specific community college, and subject (all ALP courses either began with "ENG" or "MTH"). Filters served as an efficiency factor to lessen the number of data values pulled during the query.

A second query was created to provide students' placement and served as the sorting mechanism to develop the three subgroups of students who enrolled in gateway English and math courses. The three types were on-level, developmental, and accelerated students. On-level students were students who, after completing the placement test, received a placement directly into the gateway course and were not required to complete any developmental pre-requisites. Students in the developmental and accelerated tracks were required to complete developmental

coursework either before or with their gateway course. Once students completed their placement test, their results were recorded in the "Student Groups" panel within PeopleSoft, which allowed the sorting to take place.

Descriptive Statistics

Descriptive statistics were gathered to determine whether the three cohorts in question (on-level, developmental, and ALP) were comparable. The importance of analyzing similar groups helped to validate the results as parallel characteristics controlled for extraneous factors. Four descriptive indicators were used to describe the cohorts and are presented in Table 3. All descriptive categories were setup as binary operators using the following definitions:

- Age - Traditional (less than 25 years old) and non-traditional (25 years old and older)
- Ethnicity – White and non-white
- Gender – Female and male
- Pell status – Pell awarded (greater than $0) and no Pell awarded ($0)

Table 3

Percentage of Descriptive Areas by On-Level, Developmental, and ALP Subgroups

	On-Level		Developmental		ALP	
Component	English (n = 351)	Math (n = 109)	English (n = 108)	Math (n = 80)	English (n = 400)	Math (n = 108)
Age						
< 25	70.0	74.3	32.4*	61.2	64.2	65.7
≥ 25	30.0	25.7	67.6	38.8	35.8	34.3
Ethnicity						
Non-white	25.1*	18.3	45.4	30.0	47.3	38.9
White	74.9	81.7	54.6	70.0	52.7	61.1
Gender						
Female	55.6	45.9	69.4	63.8	61.8	60.2
Male	44.4	54.1	30.6	36.2	38.2	39.8
Pell Status						
Pell	59.5	46.8*	70.4	71.2	75.3	69.4
No Pell	40.5	53.2	29.6	28.8	24.7	30.6

Note. < 25 indicates students who are between the ages of 18 (inclusive) and 25 (exclusive). Pell indicates students who received any amount of Pell award greater than zero. An asterisks denotes a significant difference relative to both of the other subgroups.

The dispersion of the On-level, Developmental, and ALP groups according to the descriptive categories of Age, Ethnicity, Gender, and Pell Status show statistical significance for English traditional age students in the developmental subgroup, relative to the other two subgroups. Significantly less minority students were also observed in the English on-level

subgroup as well as math on-level students who received a Pell award. Given the significant discrepancies and the potential to bias the results, weighted means were used for the subgroup grade point averages (Winship & Radbill, 1994). Table 4 denotes the weights used in the calculation of each subgroup grade point average. Weights were used to equate the subgroups and control for the discrepancies between the descriptive categories.

Table 4

Weights Used on Descriptive Areas for On-Level, Developmental, and ALP Subgroups

Component	English weighted mean	Math weighted mean
Age		
< 25	.59	.68
≥ 25	.41	.32
Ethnicity		
Non-white	.38	.29
White	.62	.71
Gender		
Female	.60	.56
Male	.40	.44
Pell Status		
Pell	.68	.62
No Pell	.32	.38

Note. Each of the four components were weighted at .25 after the binary weights were calculated.

Results

Once all weighted grade point averages were calculated, a two-sample t-test was conducted to determine if the differences between subgroup grade point averages were significant. Table 5 discloses all grade point averages across gateway and subsequent subgroups for math and addresses research question 1, parts A, B, E, and F.

Table 5

GPA by Math On-Level, Developmental, and ALP Subgroups

Level	Comp Group	M_1	M_2	M_{diff}	t-crit	t-value	LB	UB
	OL - Dev	3.02	2.92	0.10	1.97	0.74	-0.18	0.39
Gateway	OL – ALP	3.02	2.83	0.19	1.97	1.50	-0.06	0.45
	Dev - ALP	2.92	2.83	0.09	1.97	0.64	-0.18	0.36
	OL – Dev	2.46	2.12	0.34	1.97	1.65	-0.07	0.75
Subsequent	OL – ALP	2.46	1.99	0.47*	1.97	2.51	0.10	0.84
	Dev - ALP	2.12	1.99	0.13	1.97	0.61	-0.28	0.53

Note. M_1 = GPA of first-listed subgroup; M_2 = GPA of second-listed subgroup; $M_{diff} = M_1 – M_2$; t-crit = t critical value (95% confidence); t-value = resulting value of two-sample t-test formula; LB = lower bound; UB = upper bound; OL = On-Level; Dev = Developmental; *significant difference between means is found when the t-critical value is less than the t-value.

The analysis on math GPA indicated a statistically significant difference between on-level and ALP subsequent subgroups. To that end, the ALP subgroup had a significantly lower subsequent math course GPA relative to on-level students. At 95% confidence, on-level students should expect a .10 to .84 higher course GPA for their subsequent math class.

In addition to the analysis on math GPA for gateway and subsequent courses, completion rates (those students who finish a course with a "C" or better) and rates for D's, F's, and W's were also calculated. Confidence intervals for a proportion (95% significance), along with a hypothesis test for each rate were analyzed, with the null hypothesis being no difference between the comparison groups. Table 6 displays gateway and subsequent math course completion rates, addressing research question 1, parts C, D, G, and H.

Table 6

Completion Rates by Math On-Level, Developmental, and ALP Subgroups

Level	Comp Group	R_1	R_2	R_{diff}	p-value	LB	UB
	OL - Dev	.9083	.9125	-.0042	.2301	-.0865	.0780
Gateway	OL – ALP	.9083	.9167	-.0836	.2065	-.0836	.0668
	Dev - ALP	.9125	.9167	-.0042	.2301	-.0851	.0768
	OL – Dev	.7798	.6875	.0923	.0382	-.0356	.2203
Subsequent	OL – ALP	.7798	.6296	.1502	.0037*	.0304	.2700
	Dev - ALP	.6875	.6296	.0579	.1031	-.0786	.1943

Note. R_1 = Completion rate of first-listed subgroup; R_2 = Completion rate of second-listed subgroup; $R_{diff} = R_1 – R_2$; p-value = resulting value two-tailed test statistic (z-score); LB = lower bound; UB = upper bound; OL = On-Level; Dev = Developmental; *significant difference between rates is found when the p-value value is less than the two-tailed significance level ($p < .025$).

In regards to completion rate, the difference between the on-level and ALP subsequent subgroups is statistically significant. On-level students in the subsequent math course have a higher completion rate than ALP students. The confidence interval for the on-level/ALP

comparison provides a range of anywhere between 3% to 27% higher completion rate projection for the on-level population.

Table 7 provides the analysis on students receiving a "D" in their gateway or subsequent math course. A grade of "D" suffices for a passing grade for a student to progress from their gateway course to their subsequent course. However, for transfer students, the course credits associated with a grade of "D" will not be accepted at the transfer institution. The course for which the "D" was received can be used at the community college from which it was earned.

Table 7

Grade of "D" Rates by Math On-Level, Developmental, and ALP Subgroups

Level	Comp Group	R_1	R_2	R_{diff}	p-value	LB	UB
Gateway	OL - Dev	.0917	.0875	.0042	.2301	-.0780	.0865
	OL – ALP	.0917	.0833	.0084	.2065	-.0668	.0836
	Dev - ALP	.0875	.0833	.0042	.2301	-.0768	.0851
Subsequent	OL – Dev	.0642	.0875	-.0233	.1372	-.1004	.0539
	OL – ALP	.0642	.1574	-.0932	.0111*	-.1759	-.0105
	Dev - ALP	.0875	.1574	-.0699	.0389	-.1624	.0226

Note. R_1 = Completion rate of first-listed subgroup; R_2 = Completion rate of second-listed subgroup; $R_{diff} = R_1 – R_2$; p-value = resulting value two-tailed test statistic (z-score); LB = lower bound; UB = upper bound; OL = On-Level; Dev = Developmental; *significant difference between rates is found when the p-value value is less than the two-tailed significance level ($p < .025$).

While not directly related to the research question, providing an analysis for grades not associated with the completion rate (all grades that are not an "A," "B," or "C") offers a

comprehensive view of all grade possibilities and subgroup performance. On-level students had a significantly lower rate with regards to a grade of "D" within the subsequent course when compared to the ALP subgroup. Students in the on-level subgroup were projected to have a rate 1.1% to 17.6% lower than ALP students.

Tables 8 and 9 provide the confidence interval and hypothesis test results regarding all subgroups for students receiving an "F" or "W" in their respective courses. A grade of "F" implies the student did not withdraw from the course prior to the end-of-course date with a grade point average less than 60%. A grade of "W" implies the student withdrew from the course no later than the date on which 75% of the course was completed.

Table 8

Grade of "F" Rates by Math On-Level, Developmental, and ALP Subgroups

Level	Comp Group	R_1	R_2	R_{diff}	p-value	LB	UB
	OL - Dev	--	--	--	--	--	--
Gateway*	OL – ALP	--	--	--	--	--	--
	Dev - ALP	--	--	--	--	--	--
	OL – Dev	.0826	.1250	-.0424	.0843	-.1314	.0466
Subsequent	OL – ALP	.0826	.1481	-.0656	.0328	-.1502	.0190
	Dev - ALP	.1250	.1481	-.0231	.1632	-.1218	.0755

Note. R_1 = Completion rate of first-listed subgroup; R_2 = Completion rate of second-listed subgroup; $R_{diff} = R_1 - R_2$; p-value = resulting value two-tailed test statistic (z-score); LB = lower bound; UB = upper bound; OL = On-Level; Dev = Developmental; *significant difference between rates is found when the p-value value is less than the two-tailed significance level ($p < .025$). No students received a grade of "F" who took a subsequent course.

Table 9

Grade of "W" Rates by Math On-Level, Developmental, and ALP Subgroups

Level	Comp Group	R_1	R_2	R_{diff}	p-value	LB	UB
	OL - Dev	--	--	--	--	--	--
Gateway*	OL – ALP	--	--	--	--	--	--
	Dev - ALP	--	--	--	--	--	--
	OL – Dev	.0734	.1000	-.0266	.1289	-.1086	.0554
Subsequent	OL – ALP	.0734	.0648	.0086	.2007	-.0589	.0761
	Dev - ALP	.1000	.0648	.0352	.0947	-.0453	.1157

Note. R_1 = Completion rate of first-listed subgroup; R_2 = Completion rate of second-listed subgroup; $R_{diff} = R_1 - R_2$; p-value = resulting value two-tailed test statistic (z-score); LB = lower bound; UB = upper bound; OL = On-Level; Dev = Developmental; *significant difference between rates is found when the p-value value is less than the two-tailed significance level ($p < .025$). No students received a grade of "W" who took a subsequent course.

Grades of "F" and "W" are disaggregated due to an official act of removal from a course. Both grades have the same GPA consequences, however, students receiving a "W" stop attending the course once the withdrawal has officially occurred. While no results for a grade of "F" were found to be statistically significant, rates for the ALP subgroup were higher relative to both the on-level and developmental subgroups. As for withdrawal rates, the ALP subgroup had the lowest rate relative to the other two groups.

To address the second research question, the same analyses were performed on the data set, but for the English subgroups of on-level, developmental, and ALP. Table 10 provides the GPA analysis performed across both the gateway and subsequent courses. This table addresses research question 2, parts A, B, E, and F.

Table 10

GPA by English On-Level, Developmental, and ALP Subgroups

Level	Comp Group	M_1	M_2	M_{diff}	t-crit	t-value	LB	UB
	OL - Dev	3.41	3.16	0.25*	1.97	2.76	0.07	0.44
Gateway	OL – ALP	3.41	3.09	0.32*	1.96	4.95	0.19	0.45
	Dev - ALP	3.16	3.09	0.07	1.96	0.65	-0.13	0.27
	OL – Dev	2.56	2.39	0.17	1.97	1.04	-0.15	0.47
Subsequent	OL – ALP	2.56	2.10	0.46*	1.96	4.35	0.25	0.66
	Dev - ALP	2.39	2.10	0.29	1.96	1.86	-0.02	0.60

Note. M_1 = GPA of first-listed subgroup; M_2 = GPA of second-listed subgroup; $M_{diff} = M_1 – M_2$; t-crit = t critical value (95% confidence); t-value = resulting value of two-sample t-test formula; LB = lower bound; UB = upper bound; OL = On-Level; Dev = Developmental; *significant difference between means is found when the t-critical value is less than the t-value.

Gateway grade point average for on-level students was significantly higher when compared to both developmental and ALP students. At 95% confidence, overall GPA for the population of on-level students was projected to be between .07 and .44 higher compared to developmental students and .19 to .45 higher compared to ALP students. In the subsequent course, on-level students had a significantly higher GPA than ALP students, with a projected population GPA between .25 and .66 higher.

In addition to the analysis on English GPA for gateway and subsequent courses, completion rates (those students who finish a course with a "C" or better) and rates for D's, F's, and W's were also calculated. Confidence intervals for a proportion (95% significance), along with a hypothesis test for each rate were analyzed, with the null hypothesis being no difference

between the comparison groups. Table 11 displays gateway and subsequent English course completion rates, addressing research question 2, parts C, D, G, and H.

Table 11

Completion Rates by English On-Level, Developmental, and ALP Subgroups

Level	Comp Group	R_1	R_2	R_{diff}	p-value	LB	UB
Gateway	OL - Dev	.9630	.9444	.0185	.0989	-.0290	.0660
	OL – ALP	.9630	.9300	.0330	.0120*	.0032	.0627
	Dev - ALP	.9444	.9300	.0144	.1491	-.0355	.0644
Subsequent	OL – Dev	.7863	.7500	.0363	.1074	-.0559	.1286
	OL – ALP	.7863	.6750	.1113	.0001*	.0485	.1741
	Dev - ALP	.7500	.6750	.0750	.0334	-.0187	.1687

Note. R_1 = Completion rate of first-listed subgroup; R_2 = Completion rate of second-listed subgroup; $R_{diff} = R_1 – R_2$; p-value = resulting value two-tailed test statistic (z-score); LB = lower bound; UB = upper bound; OL = On-Level; Dev = Developmental; *significant difference between rates is found when the p-value value is less than the two-tailed significance level ($p < .025$).

The completion rate for gateway English on-level students was significantly higher than ALP students. On-level students were projected to complete 0.3% to 6.3% higher than ALP students. For subsequent English subgroups, on-level students had significantly higher completion rates, relative to ALP students. On-level students were projected to complete 4.9% to 17.4% higher than ALP students.

Table 12 provides the analysis on students receiving a "D" in their gateway or subsequent English course. Tables 13 and 14 provide the confidence interval and hypothesis test results regarding all subgroups for students receiving an "F" or "W" in their respective courses. A grade of "F" implies the student did not withdraw from the course prior to the end-of-course date with a grade point average less than 60%. A grade of "W" implies the student withdrew from the course no later than the date on which 75% of the course was completed.

Table 12

Grade of "D" Rates by English On-Level, Developmental, and ALP Subgroups

Level	Comp Group	R_1	R_2	R_{diff}	p-value	LB	UB
	OL - Dev	.0370	.0556	-.0185	.1003	-.0660	.0290
Gateway	OL – ALP	.0370	.0700	-.0330	.0120*	-.0648	-.0011
	Dev - ALP	.0556	.0700	-.0144	.1491	-.0644	.0355
	OL – Dev	.0513	.0741	-.0228	.0921	-.0773	.0317
Subsequent	OL – ALP	.0513	.0825	-.0312	.0646	-.0667	.0043
	Dev - ALP	.0741	.0825	-.0084	.1948	-.0647	.0478

Note. R_1 = Completion rate of first-listed subgroup; R_2 = Completion rate of second-listed subgroup; $R_{diff} = R_1 – R_2$; p-value = resulting value two-tailed test statistic (z-score); LB = lower bound; UB = upper bound; OL = On-Level; Dev = Developmental; *significant difference between rates is found when the p-value value is less than the two-tailed significance level ($p < .025$).

While not directly related to the research question, providing an analysis for grades not associated with the completion rate (all grades that are not an "A," "B," or "C") provides a comprehensive view of all grade possibilities and subgroup performance. On-level students had

a significantly lower rate with regards to a grade of "D" within the gateway course when compared to the ALP subgroup. On-level students were projected to be 0.1% to 6.5% lower in regards to the percent of students receiving a "D" for the gateway English course.

Table 13

Grade of "F" Rates by English On-Level, Developmental, and ALP Subgroups

Level	Comp Group	R_1	R_2	R_{diff}	p-value	LB	UB
	OL - Dev	--	--	--	--	--	--
Gateway*	OL – ALP	--	--	--	--	--	--
	Dev - ALP	--	--	--	--	--	--
	OL – Dev	.0602	.0467	.0078	.2007	-.0524	.0680
Subsequent	OL – ALP	.0602	.0632	-.0663	.0016*	-.1130	-.0196
	Dev - ALP	.0467	.0632	-.0742	.0125*	-.1373	-.0110

Note. R_1 = Completion rate of first-listed subgroup; R_2 = Completion rate of second-listed subgroup; $R_{diff} = R_1 – R_2$; p-value = resulting value two-tailed test statistic (z-score); LB = lower bound; UB = upper bound; OL = On-Level; Dev = Developmental; *significant difference between rates is found when the p-value value is less than the two-tailed significance level ($p < .025$). No students received a grade of "F" who took a subsequent course.

Table 14

Grade of "W" Rates by English On-Level, Developmental, and ALP Subgroups

Level	Comp Group	R_1	R_2	R_{diff}	p-value	LB	UB
	OL - Dev	--	--	--	--	--	--
Gateway*	OL – ALP	--	--	--	--	--	--
	Dev - ALP	--	--	--	--	--	--
	OL – Dev	.0609	.0384	-.0214	.1164	-.0823	.0396
Subsequent	OL – ALP	.0609	.0611	-.0138	.1210	-.0521	.0246
	Dev - ALP	.0384	.0611	.0076	.2007	-.0535	.0687

Note. R_1 = Completion rate of first-listed subgroup; R_2 = Completion rate of second-listed subgroup; $R_{diff} = R_1 - R_2$; p-value = resulting value two-tailed test statistic (z-score); LB = lower bound; UB = upper bound; OL = On-Level; Dev = Developmental; *significant difference between rates is found when the p-value value is less than the two-tailed significance level ($p < .025$). No students received a grade of "W" who took a subsequent course.

Grades of "F" and "W" are disaggregated due to an official act of removal from a course. Both grades have the same GPA consequences, however, students receiving a "W" stop attending the course once the institutional process for the withdrawal has occurred. The ALP subgroup was significantly higher than both the on-level and developmental subgroups in regards to a grade of "F." From a withdrawal standpoint, there were no statistically significant results, however, the ALP subgroup had the highest rate of withdrawal.

Summary

Three analyses were conducted to derive the results presented in chapter 4. A weighted grade point average, completion rates, and all other grades that are not attributable to a

completion were calculated. Each subgroup was compared to the other two subgroups to form a difference across each of the calculations. The differences were then analyzed to determine whether a significant difference exists. Table 15 provides a summary of all results and denotes which differences were significant.

Table 15

Summary of Differences

Subject	Level	Comp Group	GPA	Comp Rate	D	F	W
Math	Gateway	OL-Dev					
		OL-ALP					
		Dev-ALP					
	Subsequent	OL-Dev					
		OL-ALP	*	*	*		
		Dev-ALP					
English	Gateway	OL-Dev	*				
		OL-ALP	*	*			
		Dev-ALP					
	Subsequent	OL-Dev					
		OL-ALP	*	*	*	*	
		Dev-ALP				*	

Note. * denotes a statistically significant difference between the differences of the noted subgroups.

In regards to gateway analyses, no significant differences exist for math, however, English GPA is significantly lower for both developmental and ALP when compared to the on-level subgroup. Additionally, the gateway English completion rate was significantly lower for

the ALP subgroup when compared to the on-level subgroup. No significant differences occurred between the ALP and developmental subgroups for either gateway course.

Subsequent course GPA and completion rates tend to be significantly lower for the ALP subgroup when compared to the on-level subgroup. In regards to the differences of the ALP and developmental subgroups, only one area was significant. For the developmental and on-level subgroups, again, only one area proved significant. The results of this study indicate a significant difference between ALP and on-level subgroups across math and English subsequent courses.

CHAPTER V

DISCUSSION, RECOMMENDATIONS, AND CONCLUSION

Developmental education, or remedial education as it is commonly referred (Boylan, 1988; Xu, 2016), envelop an assortment of postsecondary programs designed to recalibrate student academic ability. An increase in the amount of criticism is evident over the past several years. Placement test results place the majority of students into developmental math, while only a third complete their remedial prerequisites (Bickerstaff, Fay, & Trimble, 2016). Complete College America (2012) reported that less than ten percent of students who take remedial courses complete their associate degree within three years and what positive effects are realized, are not sustainable (Edgecombe, Cormier, Bickerstaff, & Barragan, 2013). In addition, retention rates of students in community colleges are substantially lower relative to their four-year counterparts. Pruett and Absher (2015) attributed lower retention rates for two-year institutions, in part, to the higher enrollment rate of students who are in need of remedial education and the academic struggles they bring with them.

Developmental courses create additional requirements for students, and for those who qualify for financial aid, less subsidy may be left to apply towards courses to complete a program and credential. These outcomes, measures, and events create barriers for students in remedial education to overcome. In addition, many of the required remedial courses serve as prerequisites to on-level courses, thus preventing students from progressing through their studies until a passing grade is earned in all developmental courses. The combination of sequenced developmental coursework, the cost to pay for these classes, and the lack of success in developmental program completion creates more opportunity for failure than success.

Administrators and faculty alike are trying ways to mitigate these barriers and provide students with more opportunities to succeed while maintaining the remedial work needed to identify and address content deficits (Arendale, 2011). One way to meet this demand is to provide remediation alongside on-level coursework, which embeds on-time remediation into a co-requisite course. Also a method of developmental acceleration, this way of remediation allows students to forego the sequential nature of developmental and on-level courses for an opportunity to complete both at the same time. As a result, instructors have the opportunity to tailor remedial topics to the needs of the student, thus aligning their voids to the content and correcting the problem in a timelier fashion. Adams, Gearhart, Miller, and Roberts (2009) described this process as "integrating [developmental students] into a college-level course and then providing additional support in the form of a second course" (p. 57).

This accelerated developmental practice has expanded across many schools, of which, one was the focus of this study. A small rural community college in Virginia has implemented this approach across two developmental redesigns; one for math which began in the spring semester of 2012, and one for English which began in the spring of 2013. Borrowed from the Community College of Baltimore County (CCBC), this developmental program is termed the "Accelerated Learning Program," or ALP (Adams, Gearhart, Miller, & Roberts, 2009) and is the only community college in Virginia to utilize the ALP for both English and math. While positive anecdotal evidence existed, a formal evaluation of the program had not occurred. From a national perspective, the existing research on accelerated programs is limited, lacks a control group, and has inadequate longitudinal data (Jaggars, Hodara, Cho, & Xu, 2015). The current study provides data to address these areas. In addition, the system for which this community

college is part of plans to expand a version of the ALP in math statewide to all twenty-three community colleges by fall of 2018. A version of the ALP already exists statewide for English.

Summary of the Study

The purpose of this study was to evaluate the Accelerated Learning Program (ALP) offerings at a small rural community college in Virginia. Quantitative data were gathered retrospectively and three groups of students were created. Group assignments were determined by the student's results on an initial placement instrument and subsequent enrollment actions (on-level placement, developmental placement without ALP, developmental placement with ALP). Since the placement test determines the students' pathway, a random control and treatment group was not feasible, thus the design was quasi-experimental. A comparative analysis established whether significant differences existed between each group to determine whether students receiving the co-requisite model succeed at the same rate as the other two groups. This study provides support in the way of assessing the effectiveness of the ALP, thus contributing to the current body of knowledge of accelerated developmental education offerings.

Research questions. The following research questions guided the study:

1) Do significant grade differences in math exist between developmental students, ALP students, and on-level students?
    a. ALP students have a higher gateway math course GPA than developmental students.
    b. ALP students have a higher gateway math course GPA than on-level students.
    c. ALP students have a higher gateway math course completion rate than developmental students.

d. ALP students have a higher gateway math course completion rate than on-level students.
e. ALP students have a higher subsequent math course GPA than developmental students.
f. ALP students have a higher subsequent math course GPA than on-level students.
g. ALP students have a higher subsequent math course completion rate than developmental students.
h. ALP students have a higher subsequent math course completion rate than on-level students.

2) Do significant grade differences in English exist between developmental students, ALP students, and on-level students?
    a. ALP students have a higher gateway English course GPA than developmental students.
    b. ALP students have a higher gateway English course GPA than on-level students.
    c. ALP students have a higher gateway English course completion rate than development students.
    d. ALP students have a higher gateway English course completion rate than on-level students.
    e. ALP students have a higher subsequent English course GPA than developmental students.
    f. ALP students have a higher subsequent English course GPA than on-level students.

g. ALP students have a higher subsequent English course completion rate than developmental students.
h. ALP students have a higher subsequent English course completion rate than on-level students.

The results of this study provide new information regarding the performance of the ALP that combines an on-level and remedial course. These accelerated offerings are for English and math and have been in existence for several years, thus adding immediate applicability and need for this evaluation. The study gathered completion and non-completion rates for three groups of students in accelerated English and math courses. The three groups of students who, after their placement test, were (a) placed directly into their on-level course, (b) placed developmental and elected to enroll in the ALP, and (c) placed into developmental courses and completed their developmental pre-requisites and enrolled in their on-level course. Subsequent English and math course completion and non-completion rates were also measured for the three groups.

Professional significance. Acceleration in the developmental education environment is gaining traction across institutions and higher education systems alike (Cafarella, 2012). Legislatures are pushing colleges to create alternative pathways that lessen, or better utilize, the amount of time students spend remediating in order to reduce the likelihood a student drops out due to life circumstances (Jaggars, Hodara, Cho, & Xu, 2015). In addition, other factors that serve as negative stalwarts to student attrition are non-contextual coursework and one-shot placement testing (Jaggars et al., 2015). The ALP is implemented in a way that addresses all three areas. Acceleration shortens the amount of time students are in developmental education, as it allows students to forego time spent solely in remediation and take both on-level and remedial coursework at the same time. The developmental coursework that is co-requisite to the

on-level course is grounded in on-time remediation, thus the content directly relates to the on-level concepts. For students who perform poorly on their placement test, the opportunity exists for students to get out of developmental coursework quicker by taking an ALP course.

Even with the perceived benefits of the ALP, there is very little research available regarding the evaluation of such programs. As Jaggars, Hodara, Cho, and Xu (2015) noted, "Despite the purported benefits of accelerated developmental education, research on the topic remains sparse" (p. 6). Critics of acceleration also contend what research has been done is unconvincing, as studies lack control groups and provide no longitudinal analysis (Jaggars et al., 2015).

Methodology. This study was an evaluation of an accelerated program in developmental education at a small rural community college in Virginia. Retrospective data were gathered from gateway English and math courses from the academic years of 2010-11 through 2016-17. Subsequent English and math data were collected and analyzed in the same manner as the gateway course data. Within each gateway course, three groups of students were identified. The group which students were a part of was determined by an initial placement instrument, a diagnostic entrance exam students take before starting their coursework. Results of student placement scores were recorded and sorted by whether students who required developmental coursework or not (placed on-level). The third group was the accelerated group who were initially placed into developmental coursework. Students who placed within two modules of their gateway math requirement had the opportunity to forego their sequential remedial work and enroll in the accelerated gateway course, which entails the traditional on-level course and a co-requisite remedial course. English placement is slightly different as students were placed in one of three categories: developmental, accelerated, or on-level. Developmental English students

must complete one developmental English course, then enroll in the on-level course the following semester. Accelerated students enrolled in a gateway English course with a co-requisite remedial course and, lastly, on-level students enrolled in a gateway English course with no other stipulations (similar to what accelerated students enroll in). Essentially, each gateway course for both English and math contained (a) students who completed all developmental pre-requisites and were taking their gateway course in sequence, (b) students who were identified as needing remediation, but opted to take the gateway course along with a co-requisite developmental course, and (c) students who were on-level, but never took or were not identified as needing developmental education.

Since there are three groups, of which, one group in particular was the focus of this study, a comparative analysis was done between groups to better understand how each group performed relative to the others. A quantitative data pull consisting of course grades was utilized for this study. All grades were gathered from prior academic years with no random control group, thus utilizing a quasi-experimental framework within an ex post facto design.

The analysis consisted of computing an overall GPA and completion rate within the gateway course for each respective group. A "non-completion" rate (students who received a "D," "F," or "W") was also calculated. A confidence interval for the differences between each group was performed on the GPA, completion, and non-completion rate using a two sample t-test for GPA and a two sample z-test for completion and non-completion rates. All intervals utilized a 95% confidence. Inferences regarding the three groups were made according to the results of the confidence intervals. For any confidence intervals bounded by negative and positive values, the conclusion was not enough information to conclude there are distinct differences between the

two groups of students (as this type of interval contains zero). For any confidence intervals that did not overlap, the conclusion was a distinct difference between the two groups.

In addition to the confidence intervals, hypothesis testing was performed with the null hypothesis being no difference between each group. The differences of the three groups tested (on-level/developmental, on-level/ALP, and developmental/ALP) were gauged against a significance level of $p < .025$ for a two-tailed hypothesis. The hypothesis testing was performed on GPA difference, completion rate difference (A, B, or C) and non-completion rate difference (D, F, or W). Grades for completion rates were aggregated as one rate, whereas non-completion rate grades were disaggregated due to different meanings for each grade. A grade of "D," while a non-complete grade, allows the student to proceed to the next course. However, the course in which the "D" grade was received will not transfer to a four-year institution. A grade of "F" implies the student was enrolled for the entire course duration and had a final average below 60%. Students who received a "W" completed a formal withdraw for the respective course and were not enrolled for the entire duration of the course.

Findings. An initial comparison between the subgroups was performed to determine if significant differences existed between Age, Ethnicity, Gender, and Pell Status. Three statistically significant differences were found:

- On-level English minority students were significantly lower than both developmental and ALP subgroups.
- On-level math Pell recipients were significantly lower than both developmental and ALP subgroups.
- Developmental English traditional-aged students were significantly lower than both on-level and ALP subgroups.

To adjust for these differences, weighted means were used to equate the four descriptive areas. The values were then used in the final calculation of the overall GPA per subgroup.

In addition to the GPA, completion rates (proportion of students who received an "A," "B," or "C") and non-completion rates ("D," "F," "W") were calculated. The following significant differences were found after conducting both a confidence interval and hypothesis test for all three subgroups:

- Subsequent math: ALP students had a significantly lower GPA than on-level students.
- Subsequent math: ALP students had a significantly lower completion rate than on-level students.
- Subsequent math: ALP students had a significantly higher proportion of "D" grades received than on-level students.
- Gateway English: Developmental students had a significantly lower GPA than on-level students.
- Gateway English: ALP students had a significantly lower GPA than on-level students.
- Gateway English: ALP students had a significantly lower completion rate than on-level students.
- Subsequent English: ALP students had a significantly lower GPA than on-level students.
- Subsequent English: ALP students had a significantly lower completion rate than on-level students.
- Subsequent English: ALP students had a significantly higher proportion of "D" grades received than on-level students.
- Subsequent English: ALP students had a significantly higher proportion of "F" grades received than on-level students.

- Subsequent English: ALP students had a significantly higher proportion of "F" grades received than developmental students.

Discussion

This section provides an interpretation of the findings of the study. A connection to prior studies is made to explain how the current study links to the existing body of knowledge. In all cases, the findings of this study confirm the success of the accelerated subgroup. Further discussion provides the current study's contribution to the field by way of the use of the co-requisite form of acceleration as well as the longitudinal analysis. These findings are discussed in terms of how they can be used to improve current practices and impact the knowledge base. Ancillary to the research questions, unanticipated findings are discussed and provide additional insights from the study.

Findings related to the literature. In regards to the findings of the current study, accelerated student groups were researched by Adams et al. (2009) who studied the ALP, and Hern and Snell (2014) who researched California Accelerated Program (CAP) students. Completion rates between developmental students and these accelerated subgroups were analyzed for differences. Accelerated students were found to have higher completion rates than developmental students in their gateway English course. The current study also compared completion rates between ALP and developmental students and found no significant difference between the two subgroups in regards to completion rates of gateway English courses. Further, the current study examined completion rates beyond students' gateway English course and into their subsequent course, of which, no significant difference existed between the developmental and ALP subgroups.

Bickerstaff, Faye, and Trimble (2016) and Edgecombe (2016) studied the developmental redesign within the Virginia Community College System. Both works provided insight into the reduction of developmental credits and the implementation of the ALP model. By way of enrollment in the ALP sections, the current study exemplifies the implementation of the ALP model as well as a reduction in pure developmental course enrollment as students have opted for the ALP pathway. For this study, sample sizes for the math and English ALP subgroups were 108 and 400 respectively, compared to math and English developmental subgroup sizes of 80 and 108. Not only does the enrollment in ALP reinforce the findings from prior studies, but the results of GPA and completion rates take the literature one step further by adding a performance metric.

Additional Contributions. The current study expands on the previous literature by measuring student success longitudinally, from their gateway course GPA and completion rate through their subsequent course GPA and completion rate. While examining the immediate impact of a phenomenon, such as the ALP treatment in gateway courses, it is necessary to study the long-term impact. The current study provides insight into both gateway and subsequent course performance. The importance of the longitudinal view is to gather insight into how a particular treatment changes outcomes over time. A study of performance during the same span also provides information as to whether the effects of a treatment are sustainable.

This study also provides a detailed view of student performance via course GPA and non-completion rates. By definition, the completion rate is binary, implying the student did, or did not, complete. Having a GPA per subgroup provides a deeper understanding, not only of completion, but also performance between subgroups and allows for a measure across a continuum of performance, as opposed to a binary indicator.

Unanticipated findings. An unexpected outcome of this study was no hypothesis from either research question was confirmed. However, the performance of the ALP subgroup was comparable in many aspects to the on-level and developmental subgroups. For the areas that were found to not be statistically significant, the gateway math course completion rate was higher and the frequency of students receiving a "D" was lower than the on-level or developmental subgroups. The ALP subgroup was also comparable in all areas of analysis to the developmental subgroup for subsequent math, implying those who qualify for ALP had the same rate of success as those who completed all developmental requirements. The same held true for the ALP and developmental subgroups in gateway English courses. This finding is substantial as it raises the question of how many courses students should take in a traditionally sequenced developmental education program to appropriately prepare the student for on-level coursework.

Implications

The results of this study provide insight into current developmental education offerings for under-prepared students. Essentially, the analyses compare three ways a student can encounter their gateway course using GPA and completion rates as comparison points. On-level students enter their first math or English course without any post-secondary preparatory treatment, whereas, developmental students must complete all prep work before their gateway course. Lastly, students lacking one or two modules of developmental pre-requisites remediate their developmental needs concurrently with their on-level course utilizing the ALP pathway. The results of this study promote the conversation regarding the developmental requirements for students prior to entering their gateway course. Given the prior literature regarding poor retention and graduation rates of developmental students (AACC, 2012; Bailey, Jeong, & Cho, 2010; Quarles & Davis, 2017), if an opportunity exists to reduce the amount of remedial work

prior to students' gateway courses without negatively affecting their on-level outcomes, then institutions should explore these avenues. The ALP model is not a replacement for developmental education entirely, however, it provides students who are at the cusp of meeting on-level requirements the opportunity to shorten the amount of time in the developmental sequence prior to enrollment in their gateway course. There are limits to what the ALP model provides in the way of remediating gaps in content as students requiring substantial remediation cannot qualify for the ALP. For students who meet the ALP requirements, the data presented in this study demonstrate accelerated students perform at the same level as students who completed all developmental work prior to taking the on-level course in math or English. Therefore, accelerated pathways, such as the co-requisite model, should be given consideration to enhance and replace portions of sequenced offerings to increase efficiency that will ultimately equate to higher rates of students transitioning from developmental to on-level coursework.

Recommendations for practice. As noted in the literature review, there are many implementations of remedial programs for students (Adams et al., 2009; Burgan, 2008; Butler & Christofili, 2014; Cafarella, 2016; Wathington et al., 2016). To recalibrate student knowledge by way of developmental programming should be recognized as a way to provide opportunity to those who would normally not have a chance to improve their lives and careers through education. However, simply providing access and opportunity to learn is not enough as success initiatives and completion agendas are prominent across the post-secondary environment. Higher education leaders should be challenged to review their current models and deepen their understanding of graduation rates of developmental students at their institution. Leaders should also explore developmental programming that incorporates on-time remediation, such as the ALP model, to determine if it would fit their current models and have the opportunity to impact

students in a positive way. In addition to continuous improvement of remedial education, leaders should develop evaluations to study the effects of any program changes to ensure modifications are appropriate and enhance student success. The current study provides insight into student performance involving a developmental program innovation, consequently delivering an evaluation of the accelerated program.

Community college leaders are tasked to maintain academic rigor, all the while preventing false barriers to student success. By way of the co-requisite model, the ALP provides on-time remediation which essentially is a form of content efficiency, providing students with help for the content in their on-level course at the time it is required. Loosely connected concepts, as a sequenced approach is built upon, lacks applicability. Students struggle to connect class content within sequenced developmental courses to their future courses (Adams et al., 2009). Once application is lost, retention is affected and motivation to navigate several stop out points (each new course in a developmental sequence) could decrease. Given the similarities between developmental students and ALP students, community college leaders should review current developmental offerings and determine ways to reduce the number of courses students must complete prior to their gateway course. Allowing students the opportunity to forego a portion of their developmental pre-requisites via a co-requisite course is one avenue to achieve a reduction in developmental credits taken prior to the gateway course. Minimizing the number of exit points during the developmental sequence reduces the opportunity for a student to stop out (Jaggars, Hodara, Cho, & Xu, 2015). Providing developmental students with the co-requisite option allows students to remediate gaps in their education while completing their gateway course content without adding exit points.

The larger issue at stake is the arbitrary nature of developmental education. Not only is the content and programming of developmental courses fluid, the needs of the students who enroll in the courses all differ. While many sequenced offerings may seem like an appropriate avenue for students to develop weaknesses, the use of several courses for students to navigate turns into unintentional barriers to their on-level courses. As noted in this study, ALP and developmental students succeeded at the same rate in their gateway course and sustained their equivalent success through their subsequent course. This finding calls into question the content developmental students receive in their sequenced courses. The content should be viewed from applicability and depth in relation to their future courses, all with the understanding that attrition occurs for each additional level students must pass through to get to their on-level courses. As noted previously, the use of on-time remediation limits extraneous content and better aligns with the content of the on-level course, thus limiting non-applicable material and removing guess work from course content.

The idea that all preparatory material must be learned prior to the course is challenged with the co-requisite model. The use of a linear approach, as in a sequenced traditional developmental pathway, to scaffold concepts overgeneralizes course content and creates a generic product for all students. The performance of a student who successfully factors polynomials and then scaffolds into solving for an unknown within an equation may have nothing to do with the outcomes in their on-level course. However, passing developmental courses with content that may or may not be applicable to the gateway course is the acceptable means by which students meet pre-requisites and enter the initial on-level course. A shift in thinking from the linear approach to a customizable implementation lessens the need for sequenced offerings. The co-requisite model tailors content specific to student needs when it is

most applicable. The on-time aspect could lead to increased engagement and success for the student all the while reducing the number of developmental courses taken prior to the gateway course.

In theory, ALP students should enter their on-level courses with the largest gaps in their preparatory content, however, the results of this study indicate ALP students and developmental students succeed at the same rate in regards to GPA and completion rate. The mechanism which makes up for the perceived gaps ALP students have is the use of the co-requisite model. Simply put, the opportunity to address gaps at the moment students identify an issue has extreme value that can have tremendous impacts on student success. Instructors are able to maintain academic rigor by way of remediating and strengthening concepts during the extended ALP time which ties directly to current course content.

Perhaps the most distressing conclusion from this study is the performance of students who place developmental, regardless of whether the student chooses the ALP or completes all remedial pre-requisites. From a practical standpoint, on-level placed students performed better in nearly every measure in both GPA and completion rates for English and math courses. Essentially, placement in developmental education increases the likelihood of attrition relative to on-level placed students. The use of these results and the growing body of knowledge regarding credentialing of students who place in developmental should be shared with K-12 partners. Ensuring community college feeder systems are knowledgeable of the low rates of success developmentally-placed students experience promotes conversations on a K-14 scale that can explore models that work to improve student success with a goal of having more students place on-level.

A pathway that begins with developmental coursework is, more times than not, a pathway to failure. This, in turn, compromises the purpose of community colleges. Given the high dropout rates of students in developmental pathways, the open access mission is most accessible for students who are college ready. Community college personnel create the arbitrary line to determine whether a student places into post-secondary work or remediation. While the use of developmental programming has a rational and worthy foundation, it comes with a responsibility to be as efficient and direct as possible. This translates to enrolling students in a program with the least amount of remedial obstacles, to include tailored content, and with the hopes of addressing exactly what the student needs to be successful. Institutions should place this duty as the highest priority as the impact is on the majority of students. If institutions are careless with placement and programming, students will not progress nor have the opportunity to succeed at college-level coursework.

An institutional process that ultimately prevents students from receiving a chance to complete college courses disables the mission of America's community colleges. This is why exploration and improvement of remediation is a must for higher education institutions. With the lack of success of students in the developmental pathway, developmental programming appears to be more of a sorting mechanism, rather than a calibration tool. Students are sorted out of higher education, never receiving an opportunity to attempt college-level coursework. It should not be the place of the institution to direct students away from the community college prior to the student attempting on-level content. The student should bear the obligation in determining whether to enroll in college-level coursework. As noted in this study, students in the ALP subgroup, on the whole, performed at the same rate as students in the developmental subgroup. Foregoing a portion of developmental coursework, as in the case of the ALP students,

may have given opportunity for some students to take on-level coursework when, if the traditional developmental pathway had been the choice, the ALP students would have dropped out. The accelerated approach provided efficiency by reducing the number of developmental credits taken. It delivered tailored content, specific to both student needs and the on-level curriculum. Most of all, it gave the student the opportunity to take college-level courses without the institution determining their success prior to their enrollment in a gateway course, thus aligning more appropriately to the open access mission of the community college.

Recommendations for further research. Colleges with similar accelerated models should also be studied to determine if comparable results occur. For this study, a transition from one placement instrument to another, as well as a change in developmental treatments occurred. In 2012, the COMPASS placement instrument was replaced by the Virginia Placement Test (VPT). Developmental offerings for math changed from semester-long courses to a modularized approach. A similar study containing students who were all placed by the same instrument and received the same developmental programming would benefit the current body of knowledge as it would help control for placement and remedial treatment prior to the gateway course.

This study captured student data for those who completed both their gateway and subsequent courses in math and English. Only students who received a "D" or higher in their gateway course were included in this study. Gathering how many students began in each cohort and noting their attrition from developmental to gateway (specifically for the developmental subgroup) and from gateway to subsequent courses would provide a deeper level of insight into the success of the three subgroups. While GPA and completion rates are an indicator of success, knowing more in regards to how many students drop out between each exit point could provide a more comprehensive understanding of the effectiveness of accelerated platform.

As the literature has noted, students who start in developmental courses have a lower graduation rate compared to their on-level peers (Quarles & Davis, 2017). A study that examines graduation rates, as well as time to completion, for all three subgroups would also provide another way of measuring success. This type of study would add to the existing body of knowledge by expanding the longitudinal data for developmental acceleration, as graduation rates encompass the entire student experience at an institution. To accompany the graduation rates, time to completion would help community college leaders understand if shortening the developmental pipeline can be attributed to overall success in completing a post-secondary credential.

A further evaluation of subsequent English courses should also be considered. The results of this study indicate subsequent English was the only instance where both on-level and developmental students were significantly different than ALP students. Specifically, this occurrence was for students who received an "F" in their subsequent English course. Further examination regarding students' perceptions would provide insight as to whether ALP students had academic barriers or other obstacles that may have contributed to the lower rate of success. Understanding why, or how, ALP students arrived at their failing grade could provide insight into their struggles, specifically in the subsequent course. Additionally, instructor feedback regarding the quality of their work could potentially provide an awareness as to the specific areas of inadequacy. Not only would feedback on ALP students be useful, but data for developmental students should also be incorporated. Feedback from both groups across course objectives in the subsequent English course would provide a comparison to determine if one group is weaker than another.

Conclusion

A developing theme throughout this study was how different the three subgroups were at the beginning of the gateway course. On-level students, placed accordingly by the initial placement instrument, go directly into the gateway English or math course. By way of the on-level placement, students have demonstrated proficiency across many areas of English or math content, essentially demonstrating their competence for the respective subject. In all aspects, this should be taken as an indicator of success. For those who do not receive an on-level placement, developmental programming is mandated that not only serves as a tool to remediate gaps, but also as a barrier for many. Specific to the developmental subgroup, only those who were successful in all their developmental pre-requisite courses went on to their gateway and subsequent courses. There were no developmental students who stopped out or dropped out of their developmental sequence contained in this study. In essence, the developmental subgroup is a concentrated cohort of successful students who should perform relatively close to the on-level placed students. ALP students are allowed to forego up to two credits of their developmental sequencing, for which, these students remediate their needs during the same semester they receive their gateway content. In bypassing pre-requisites, it would stand to reason that some students who would have dropped out in the developmental-only route, go on to take their on-level course via the ALP pathway. Of all the subgroups, the ALP should be the weakest of the three, given it contains students who have not completed all pre-requisites. Further, ALP students have the most content to master when figuring the remedial work involved and the on-level course content. This, in turn, makes for the largest gains to remediate their gaps in subject knowledge and infuse new learning from on-level course content. It stands to reason that GPA and completion rates of the ALP subgroup should be the lowest. However, when compared to

the developmental subgroup, the ALP subgroup was, in all statistical aspects, equivalent across gateway English and math, as well as subsequent math.

While all but one comparison area (English gateway course GPA) of the developmental and on-level subgroups failed to reject the null, from a descriptive standpoint, the developmental subgroup GPA and rates were numerically closer to the ALP subgroup. In nine of the sixteen comparison categories, the developmental and ALP subgroups had the smallest difference, noting a trend of behavior more similar than the other comparison combinations (on-level/developmental and on-level/ALP). Since ALP students enter their gateway course with larger gaps than their developmental counterparts, for these two groups to be similar notes the substantial gains made by the ALP subgroup.

In an era of increasing data flow, the expectation of continuous improvement is more a norm than an extreme for higher education institutions. Developmental education continues to garner attention as the students who encounter it continue to show lackluster results in regards to the ultimate achievement for which most students strive: a credential. The current study explored a delivery method for the last component of remedial work, but serves as a point in a much larger conversation. Community colleges are challenged as an open access entity with a mission to transform communities, fulfill employer needs, and improve lives for the people in its service region. To achieve these ideals means addressing a continuum of student knowledge and experiences wider than any other type of higher education institution. When combining open access with service region needs, something must be in place to give students a chance to succeed. Preparatory work will always have its place in community colleges and must be a part of continuous improvement that drives institutions of higher education today. Community colleges place a significant number of students in the developmental pathway. In doing so,

substantial attrition occurs prior to completing developmental courses, preventing students from having the opportunity to enroll in the college-level course for which the developmental content was required. Even with success in other college-level courses, students encounter a barrier to completion in English and math through remedial coursework. For community colleges to have such a high rate of non-completers coming from the developmental pathway is a failure to both the area for which it serves and the overall mission. As Xu (2016) noted, "Access without progress is no more than an empty promise" (p. 496). Community colleges provide opportunity and when students are not allowed the chance to enroll in college-level work, something is amiss. The exploration of different methods to accelerate students through remedial work addresses the first step in the access-to-success pathway by giving students a better opportunity to enroll in their gateway courses and ultimately meet their desired goals.

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APPENDIX: HUMAN SUBJECTS EXEMPTION

OLD DOMINION UNIVERSITY

OFFICE OF THE VICE PRESIDENT FOR RESEARCH

Physical Address
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Mailing Address
Office of Research
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Phone(757) 683-3460
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DATE:	July 12, 2017
TO:	Mitchell Williams
FROM:	Old Dominion University Education Human Subjects Review Committee
PROJECT TITLE:	[1091449-1] A Longitudinal Analysis of the Co-requisite Model of Developmental Acceleration
REFERENCE #:	
SUBMISSION TYPE:	New Project
ACTION:	DETERMINATION OF EXEMPT STATUS
DECISION DATE:	July 12, 2017
REVIEW CATEGORY:	Exemption category # *6.4*

Thank you for your submission of New Project materials for this project. The Old Dominion University Education Human Subjects Review Committee has determined this project is EXEMPT FROM IRB REVIEW according to federal regulations.

We will retain a copy of this correspondence within our records.

If you have any questions, please contact Jill Stefaniak at (757) 683-6696 or jstefani@odu.edu. Please include your project title and reference number in all correspondence with this committee.

This letter has been electronically signed in accordance with all applicable regulations, and a copy is retained within Old Dominion University Education Human Subjects Review Committee's records.

VITA

Christopher Sean Wikstrom

Education

2005-2007 Virginia Tech Blacksburg, VA
M.A., Education Curriculum & Instruction, Educational Psychology Program

1998-2002 Virginia Tech Blacksburg, VA
B.S., Mathematics, Education Concentration

Experience

2016-Present Patrick Henry Community College Martinsville, VA

Director, Institutional Research and Effectiveness

Leadership and Duty

- SACSCOC Evaluator and Reaffirmation Co-chair
- Manage data collection and reporting for strategic planning/annual report across 3,500 annual assessments and 100 service area goals
- Manage Institutional Research and Accreditation budgets
- Create queries and gather data for various surveys such as IPEDS, CCSSE, ACT, NPSAS, Veterans (2), Graduate, program reviews, etc.
- Chair Data Team, Assessment Committee, Program Review Subcommittee

Promotion

- Fall, 2017 *Going the Extra Mile* recipient

Conferences

- Dream 2018 Conference (Nashville, TN)
- SACSCOC 2016 winter meeting (Atlanta, GA)
- SACSCOC 2016 summer meeting (Grapevine, TX)

Publications

- Lusk, D.L., Evans, A.D., Jeffrey, T.R., Palmer, K.R., Wikstrom, C.S., & Doolittle, P.E. (2009). Multimedia learning and individual differences: Mediating the effects of working memory capacity with segmentation. *British Journal Of Educational Technology, 40*(4), 636-651. doi:10.1111/j.1467-8535.2008.00848.x

2011-2016 Patrick Henry Community College Martinsville, VA

Assistant Professor of Mathematics/Assessment Coordinator

Leadership and Duty

- President's Strategic Leadership Cabinet, 2015

- Assessment Coordinator, 2014-2016
- Created presentations and data summaries for in-service and other meetings on graduation, retention, course completion, etc.

- SCALE Trainer (presented on Active and Cooperative Learning in Texarkana, TX, Martinsville, VA, Washington D.C., Richmond, VA, Cleveland, OH, Longview, WA, Austin, TX, Greenville, MI)

- Chaired and participated on multiple interview committees, member of Assessment (Chair, 2014-pres.), Data Team (Chair, 2016)

Promotion

- Annual Faculty Recognition Award for Faculty Leadership, 2015-2016
- Faculty Award for Professional Excellence Nominee 2014-2015
- Annual Faculty Recognition Award Nominee 2014-2015
- Outstanding Faculty Award Recipient, 2013-2014
- VCCS Excellence in Education Nominee, 2013-2014
- Promoted from instructor to assistant professor, 2013

Conferences & Presentations

- SACSCOC Winter Conference, December 2015
- Chancellor's Leadership Academy at Ozarks Technical CC, March 2015
- Presented at Achieving the Dream Conference, February 2015
- Chancellor's Leadership Academy for VCCS, September 2014
- Presented at Longwood University's Teacher Conference, May 2014
- Presented at New Horizons on the Flipped Classroom, April 2014
- Presented at NADE on Modularization of Dev. Math, March 2014
- Chancellor's Developmental Education Institute, Summer 2012
- Presented at VMATYC conference on VCCS Math Redesign, Fall 2011
- Attended AMATYC, ATD, Dev. Ed., FlipCon, and NADE conferences
- Attended Cooperative and Collaborative Learning Training at University of Minnesota (Johnson Brothers) Summer 2012

Courses Taught

- Pre-Algebra, Algebra I, and Algebra II in the classroom, compressed video, and online
- MTH 120 ALP, MTH 151 ALP, MTH 157 (online)
- Created and taught MTH 157 ALP course