AN INTERVENTION TO IMPROVE OUTCOMES FOR UNDER-RESOURCED STUDENTS:
THE CASE OF CENTRAL PIEDMONT COMMUNITY COLLEGE

Amy E. Bruining and Dena K. Shonts

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Department of Human Services
College of Education & Allied Professions
Western Carolina University

Disquisition Chair: Dr. Kofi Lomotey
Bardo Distinguished Professor

Committee Members:
Dr. Robert Crow
Dr. Heather Hill
Dr. Brandi Hinnant-Crawford

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Abstract

Under-resourced community college students struggle to meet their basic needs, often facing food and housing insecurities, all while trying to focus on their studies. A handful of institutions have increased the graduation rates of their under-resourced student populations by creating holistic models that provide a variety of financial, academic, and non-academic support. This improvement initiative embedded academic tutors and a connection to community basic needs support resources into targeted eight-week compressed math sections. Instructors in the study sections encouraged students to complete the online benefits screener at the College's Single Stop Office, which served as the connection to institutional and community resources that can support their basic needs (i.e., food pantries, assistance with childcare, utilities). In addition, a math tutor from the College's Academic Learning Center was embedded in the course. The tutor proactively reached out to students and offered individual and group tutoring sessions. In this disquisition we evaluate the impact of embedding academic and non-academic supports into eight-week sections of targeted math courses on student success and retention to the next term of under-resourced students at Central Piedmont Community College.

We used the Plan-Do-Study-Act (PDSA) cycle as a framework for inquiry (Langley et al., 2009). Through inductive and deductive inquiry, PDSA cycles enable researchers to guide continuous improvement through repeated phases of inquiry, strategic implementation, data collection, and amended future action based on results (Langley et al., 2009)

Introduction and Statement of the Problem

Every year millions of students decide to attend a community college rather than a four-year college or university. For these students, community colleges provide opportunities that universities do not. The smaller class sizes, hands-on learning experiences, industry-focused training, and the flexibility to work and care for a family allows for an opportunity at a post-secondary education (Chen, 2019). Community colleges provide an affordable pathway to careers with family-sustaining wages; they are often the only financially feasible access to higher education for thousands of students experiencing challenges associated with poverty. Although community colleges possess the potential to positively affect their students' social mobility, fewer than half of community college students leave with a degree (Community College Research Center, 2019). Completion data reflect broader societal inequities when students' economic status is also considered. While the open admissions nature of community colleges means that students with a wide variety of academic preparation and backgrounds enroll, community colleges across the nation fail to graduate students with fewer financial resources at the same rate as their more affluent counterparts. Although most students who enter community college fail to earn a credential, the odds of completing are even less for under-resourced students. According to the National Student Clearinghouse Research Center (NCES, 2018), 39.2% of first-time college students who enrolled at a community college in 2012 earned a credential (certificate, associate degree, or bachelor's degree) within six years. Comparatively, 62.4% of the first-time students who enrolled at a college or university seeking a bachelor's degree in 2012 graduated within six years, despite the longer length of their degree program (NCES, 2020). Students who enroll at four-year institutions typically focus on degree attainment, while community college students enroll for a variety of reasons, including transfer preparation, career advancement, and skill attainment, in addition to earning a degree. Although completion

data by student income is more difficult to obtain, only 33% of students with annual family incomes in the lowest bracket (less than $30,000) who enrolled in a community college earned a credential within six years (Community College Research Center, 2019). Increasing the graduation rates of students from low-income backgrounds positively impacts these students' earnings potential and positively impacts social and economic mobility within the larger community.

Social Justice Implications

Social justice is defined as "the view that everyone deserves equal economic, political, and social rights and opportunities" (The San Diego Foundation, 2020, para.5). Increasing graduation rates has social justice implications, such as positively impacting a student's economic mobility, opportunities, and social rights. An individual with a high school degree can increase their yearly earning potential upwards of $20,000 by completing a two-year degree and by $40,000 by completing a four-year degree (Haskins & Holzer, 2009). This increase in financial gain "shows that in modern economies, education generates real economic advantages, even when other differences between those with more and those with less education are controlled" (Haskins & Holzer, 2009, p.9). Financial gains are a gateway to increasing social rights. Increased earnings allow individuals and their families the opportunity to have their basic needs met through adequate food, housing, and healthcare. Increasing a family's economic mobility and social rights can lead to increased opportunities. It affords the opportunity for health, employment, homeownership, and civic participation. The social justice implications are indicative of the benefits that can occur from completing a two-year or four-year degree regardless of an individual's economic background.

Description of Disquisition

This disquisition represents the capstone project for the Executive Doctor of Education (EdD) program at Western Carolina University (WCU). Many EdD programs, including WCU's, historically required the traditional five-chapter dissertation as the hallmark of their programs, similar to those required of students in PhD programs. Inspired by the work of the Carnegie Project on the Education Doctorate (CPED), WCU re-engineered their EdD program to focus on building the leadership and inquiry capacity to successfully address authentic problems education practitioners face in their institutions (Lomotey, 2018). The redesigned program required a new approach to the capstone research, and the disquisition was born.

A disquisition differs from a traditional dissertation, just as the aims of an EdD program differ from those of a PhD program. Traditional PhD programs produce graduates who seek to advance research and theoretical knowledge of a subject. EdD programs, however, produce institutional leaders who need to apply their learning to address the real problems of practice they face in the workplace (Lomotey, 2018; Perry et al., 2020).

The traditional research-based format of a dissertation relies on research methodologies and theories designed to produce more knowledge about the discipline; this structure does not necessarily provide practitioners with methods that can be used to improve outcomes at their institutions and are more conducive to a PhD program. In contrast to the dissertation, Lomotey (2018) describes a disquisition as "a formal, problem-based discourse or treatise in which a problem of practice is identified, described, analyzed and addressed in depth, including methods and strategies used to bring about change and to assess whether the change is an improvement." (p. 4). As EdD programs train leaders to apply their learning to real problems of practice, using a disquisition as the framework enables the student to apply their leadership skills toward organizational improvement (Lomotey, 2018).

The Problem of Practice

In addition to the academic demands of college, many students struggle to cover the costs of attending school, a challenge that impedes degree completion (Engle & Tinto, 2008). For under-resourced students attending college, securing basic needs frequently remains difficult. In 2018, approximately 86,000 students from 123 two- and four-year colleges across the country completed the #RealCollege Survey, an instrument designed to gauge basic needs security (Goldrick-Rab, 2019). The results confirmed that large percentages of college students regularly experience basic needs insecurities, with 45% of students reporting food insecurity within the past 30 days, 56% reporting housing insecurity within the previous year, and 17% indicating they were homeless at some point during the previous year (Goldrick-Rab, 2019). Unfortunately, students continue to struggle financially, even when working part-time while in college. Approximately two-thirds of young community college students work more than 20 hours per week, often to offset school costs or to help support their families (Duke-Benfield & Saunders, 2016). Long work hours limit the time available to focus on school; 58% of community college students attend part-time to accommodate work (Duke-Benfield & Saunders, 2016).

When students are experiencing housing insecurity and facing hunger, it can become increasingly difficult for them to focus on their academic goals and complete their education. Financial insecurity can increase individual stress levels in a way that negatively impacts brain function and academic performance (Broton et al., 2014). In addition to economic concerns, under-resourced college students also face numerous logistical challenges, such as securing reliable transportation, childcare, and Internet access. This intervention focused on improving the academic performance, semester to semester retention, and completion rates of under-resourced students who experience challenges associated with a lack of basic resources, often resulting from systems that advantage the privileged class. Community college students who struggle to

meet their basic needs are not retained and do not complete a credential at the same rate as students with more significant resources.

History and Current State of the Problem

Community colleges have long been critical drivers in achieving upward mobility (The Century Foundation, 2019). Although community colleges offer a wide variety of educational opportunities that open the door to obtaining a living wage, completion rates remain low, with less than 40% of new students earning a degree after six years (NCES, 2018). Comparatively, 62.4% of new students at four-year institutions earn a bachelor's degree after six years (NCES, 2020). Community college students enroll for a variety of reasons that do not always include degree completion, such as preparation to transfer to a senior institution, dual enrollment during high school, and skill attainment in order to obtain a job (Community College Research Center, 2019). Conversely, students enrolling in four-year institutions are primarily working toward the goal of earning a degree. In addition, community colleges typically have significantly fewer financial resources than four-year colleges and universities to devote to per-student expenditures, despite enrolling a larger percentage of students with educational and financial needs (The Century Foundation, 2019). A U.S. Government Accountability Office report (2018) highlighted the connection between food and housing insecurity and credential completion, noting that a lack of basic resources undermines many students' educational experience.

Financial concerns, however, are not the only inequitable challenges community college students face. Significant numbers of community college students, including both recent high school graduates and older students returning to education from the workforce, enroll without the academic preparation needed to succeed in college (Price et al., 2014). Over half of community college students are referred to developmental education courses to boost their academic preparation for college work (Bailey et al., 2010). Although intended to increase success,

developmental education programs are often lengthy and ultimately decrease a student's likelihood of credential completion (Bailey et al., 2010).

In 2017, NCES began including the eight-year graduation rates of students receiving Pell grants in their published information on higher education institutions. Awarded by the U.S. Department of Education, Pell grants are a need-based form of financial aid that does not need to be repaid and is designed to help eligible low-income students pay for college expenses (Kerr, 2021). According to this metric, only 22% of first-time, full-time students receiving Pell grants completed an associate degree or certificate program within eight years of enrolling. Belfield and Bailey's (2011) review of existing literature found that students who earn a community college credential realize higher earnings potential than those who do not attend college at all. Community college attendance is also associated with increased health benefits and decreased welfare dependence and crime (Belfield & Bailey, 2011). Even completing shorter certificate programs, particularly those at least one year in length, returns economic gains for students (Bosworth, 2010). If community college graduation provides a financial return that leads to upward mobility, then the completion agenda becomes even more crucial.

Literature Review

In this literature review we examine the causes that contribute to low retention and completion rates of under-resourced students in community colleges. These causes include inequitable academic preparation for college work, lack of resources for those experiencing forms of poverty, minimal basic needs support services for those with food or housing insecurities, inadequate institutional structures for helping students build momentum toward completion, and college employees with a limited understanding of the resources that are available to help low-income students (Hackman & Wageman, 1995). Understanding these

existing causes can assist in developing support structures that provide an equitable opportunity for education.

Inequitable K-12 Preparation

During the 1800s, college admission standards were non-existent. It was not until the Committee of Ten was appointed in 1892 that colleges and universities began playing an essential role in ensuring that high school students were prepared for college by developing uniform standards for each academic course (Kirst & Usdan, 2009). In 1918 a report released by the Cardinal Principles of Secondary Education advocated for high schools to prepare students for various tracks such as academics, vocational training, family life, good health, citizenship, and character (Kirst & Usdan, 2009). The report gained momentum and changed the way high schools operated. This change ultimately allowed a small number of students to take challenging courses and prepare for a college education. As the number of students who were ready for college lessened, opportunities decreased, leading to increased economic disparities.

A family's income may play a pivotal role in a student's success during their K-12 years. Recent studies indicate that the difference in outcomes between high- and low-income students is larger than the gap between Black and White students (Haskins & Rouse, 2013). Studies suggest that 34% of under-resourced students enroll in college compared to 79% of their wealthier peers (Haskins & Rouse, 2013). The majority of K-12 students from underserved backgrounds who pursue a college education are first-generation college students. Kirst (2004) suggests that these students are not adequately prepared because they do not receive the information they need for college. Students do not receive adequate information about preparing for college, and many disadvantaged parents lack the experience and knowledge needed to assist their children. According to Kirst and Venezia (2004):

Forty-two percent, 44 percent, and 47 of economically disadvantaged parents in Illinois, Maryland, and Oregon, respectively, stated that they had received college information compared with 74%, 71%, and 66% of their more economically well-off counterparts in the same states.

Additional research suggests that under-resourced students are more likely to attend poorly resourced K-12 schools that do not provide the same academic rigor as schools with the resources to attract and retain the most qualified teachers and administrators. These students are overrepresented in open-access community college programs that provide fewer labor returns (Deil-Amen & DeLuca, 2010). Researchers in The Bridge Project at Stanford University discovered that many K-12 students entering community colleges did not understand the standards for placement tests (Kirst & Usdan, 2009). Over 60% of students were placed into remedial courses, many of whom assumed their high school courses were adequate preparation (2009). In addition, many "students don't feel academically prepared for college because there are fewer academic expectations in terms of following directions, completing assignments on time" (Sanchez, 2019, para. 4). This lack of resources contributes to the equity gap between under-resourced students and their more affluent counterparts (McNair, et al., 2020). The term "equity gap" helps establish the responsibility that institutions have in creating equitable systems where all students can thrive.

As many K-12 students are already unprepared for higher education, the current coronavirus pandemic is only making it worse. Students have been forced into an online learning environment. This can be incredibly challenging for low-income students, who lack the necessary resources needed to be successful, such as access to the Internet and a computer. Schools in metropolitan K-12 districts are experiencing enrollment declines of up to five percent, further negatively impacting college preparedness (Brownlee, 2020).

Lack of Resources for those Experiencing Poverty

If students cannot afford to go to school, it can be challenging to build momentum toward completion. Affordability plays a crucial role in why large numbers of economically challenged students – many who are students of color -- do not complete their college degrees (Goldrick-Rab, 2010). The knowledge and understanding of financial resources, such as the Free Application for Student Federal Aid (FAFSA), grant opportunities, and scholarship applications, are typically held with a family member who attended college (Goldrick-Rab, 2010). In addition to the cost of tuition, books, and fees, students pay an opportunity cost. Opportunity costs, which are not included in the financial aid formula, encompass everything a student foregoes to be a student, such as lost wages (Anderson et al., 2016). Federal financial assistance is awarded via a formula-based approach utilizing information included in the FAFSA. It can be awarded in the form of Pell Grants, work-study positions, and other federally supported aid programs. Since its introduction in the 1970s, the Pell Grant has been the cornerstone of federal collegiate financial aid. However, studies examining its effect on under-resourced students' enrollment rates have not been promising (Hansen, 1983; Kane, 1995). Because not all students qualify for the Pell Grant and because the rising cost of a community college education means that students face additional expenses even with a Pell Grant, more community college students turn to alternate funding sources. To assist with opportunity costs and financial needs not covered by Pell Grants, many students seek loans to finance their higher education. One urban community college in North Carolina estimates that for a single student, one full year of tuition and expenses costs approximately $29,350. Table 1 breaks down the expenses associated with these costs.

Table 1

Yearly Tuition and Living Expenses for a Single Student

	Fall	Spring	Summer	Total (1 year)
Tuition & Fees	$4,456	$4,456	$2,830	$11,742
Books and Supplies	$750	$750	$750	$2,250
Living Expenses				$10,350
Transportation				$3,000
Medical Insurance				$500
Personal/Misc.				$1,500
Total Expenses				$29,342

Note. Tuition and living expenses are from Wake Technical College, Raleigh, North Carolina.

https://www.waketech.edu/student-services/international-students-office/expenses

A staggering 43 million adult Americans currently owe approximately $1.5 trillion dollars in federally backed student loan debt plus an additional $119 billion in private student loans (Miller et al., 2019). McKinney and Burridge (2015) found that federal loans do more to impede low-income students' persistence than they do to promote it. They also noted that financial aid offices tend to be understaffed and lack the personnel needed to educate students about financial literacy and the risks associated with borrowing (McKinney & Burridge, 2015). Reducing college costs, however, has been demonstrated to increase completion, mainly if the aid program is straightforward and available to large numbers, as are many of the state-funded programs that provide scholarships to students at public colleges who meet a minimum GPA threshold (Deming & Dynarski, 2009). Other colleges have worked to connect under-resourced students with community agencies that provide childcare, food, housing, and other assistance that allow students to focus on their studies.

Understanding and figuring out how to pay for college can be challenging and confusing, particularly for under-resourced and first-generation students. Adding unexpected financial emergencies into the mix can make it extremely difficult for under-resourced college students to persist and complete their college degree programs. Although some colleges have established emergency financial assistance loan programs, unexpected fiscal emergencies, such as car repairs, medical crises, or family obligations can derail a student's educational journey (Benz, 2016).

Minimal Basic Needs Support Services

In response to the financial struggles many students face, some colleges have found ways to connect their students to basic needs resources. Although the demand for support is great, the support services at most institutions remain minimal. Emerging research has been instrumental in discovering key findings and developing recommendations for implementing basic needs support service models on campuses (Goldrick-Rab, 2019). The Century Foundation (2019) recommended that "researchers should separate costs associated with the direct educational services from equally important costs associated with students' basic needs" (p. 26). By doing this, policymakers would better understand what services and resources need to be supported. The Institute for College Access and Success recommends policymakers advocate for increasing Pell Grants and lowering the net cost of tuition (Ahlman & Cochrane, 2017). California appears to be the most progressive state in terms of policies that provide basic need support services. In 2014 the Hunger-Free Education Opportunity Act was passed. In 2016 the College Student Hunger Relief Act was passed with the Community College Showers Access Bill and the Success for Youth in Higher Education Act. Through this policy, state funding provides at least one campus liaison who works with students who are experiencing homelessness (The Century Foundation, 2019). In California, the Post-Secondary Education: Student Hunger Act requires

colleges to provide on-campus food pantries and assist students with benefits enrollment (California Mental Health Services Authority, 2019). In New York, the Governor called for all public colleges in the City of New York to provide access to free food on their campuses through an onsite food pantry or a partnership with a local food bank (Smith, 2019). In May 2019, the New Jersey Governor signed a bill into law that provided colleges $1 million to support hunger initiatives (Smith, 2019). New York, New Jersey, and California are prime examples of how state policymakers can influence and advocate for policy that will positively impact services that directly correlate with increased college completion rates.

A recurring theme emerging from the research is the recommendation of campuses establishing basic needs support centers. The purpose of these centers is to provide students with a single primary location for comprehensive assistance (Ahlman & Cochrane, 2017). An Issue Brief by Mathematica Policy Research recommends that establishing a center will increase the visibility of resources that are offered to address poverty (Sullivan et al., 2018). This service center or centralized hub should enable colleges to (1) build and maintain the knowledge necessary for providing benefits access services for students, (2) offer opportunities to address multiple student needs at one time, and (3) help strengthen the college relationship with state and county agencies that administer the public benefits program. (Price et al., 2014). It is crucial that the center or hub has dedicated staff with committed college funds and resources. A centralized location will enable students to access the resources they need.

Inadequate Institutional Structures

Most community colleges' institutional structures reflect a historical emphasis on access (Bailey et al., 2015). This focus on access resulted in colleges leaving students to wander through complex course catalogs to select their degree programs. Although most community colleges offer a dizzying array of support services and programs, few services are required, and students

are left to discover and pursue them independently. When services are not mandated, however, only the students with the cultural and social capital to know the services are both available and beneficial actually take advantage of them (Karp et al., 2008). Under-resourced students, who are more likely to be first-generation college students, may not be familiar with an advisor's role and may not seek their assistance (Karp et al., 2008). Students who have not met with an advisor may end up taking unnecessary coursework, depleting crucial financial funds, and prolonging their time to completion. Community colleges have historically prided themselves on providing their students with freedom and choice; however, for many students, this choice translates to a lack of structure to guide students on a pathway to graduation (Scott-Clayton, 2011).

Despite these challenges, several colleges have found evidence-based practices that positively impact low-income students' completion rates. Gardenhire-Crooks et al.'s (2006) qualitative study of under-resourced students at two community colleges found that students identified the targeted supports they received as crucial factors in their persistence. Students reported that (1) participation in a student orientation course provided valuable information about the college, and that (2) the regular, individualized advising they received prevented them from experiencing some of the institutional problems other students might face (Gardenhire-Crooks et al., 2006). In addition, students who enrolled in a learning community -- a group of students taking shared classes -- felt they received more attention from faculty (Gardenhire-Crooks et al., 2006). Orientation courses, also referred to as student success courses, have been linked to higher success rates in Florida (Zeidenberg et al., 2007). In her 2016 study, Karp found that intrusive, holistic programs provided several advantages for students, including (1) positive student outcomes when these programs helped students create social relationships, (2) assisting students in mastering the 'unwritten rules' of college culture, (3) teaching students 'insider' knowledge about how to manage college, and (4) providing primary and financial supports that

enabled them to stay in school (Karp, 2016). The recent increase in dual enrollment course offerings has provided under-resourced students with access to college courses while they are enrolled in high school, frequently at no cost. While dual enrollment programs positively impact subsequent college enrollment and completion for all students, they significantly help financially under-resourced students and students of color (Taylor, 2015).

A growing body of literature reinforces the importance of putting students on a structured pathway and building their credit attainment momentum early during their college career. The selection of a program major, or pathway, is a significant decision for all students, especially for under-resourced students. Some pathways, such as those in health science or STEM fields, lead to higher completion rates, particularly among under-resourced students (Holzer & Xu, 2019). Furthermore, community college students frequently change their programs, often resulting in a loss of credit that prolongs their completion (Holzer & Zu, 2019). Guiding students to the right pathway that meets their academic and career goals becomes even more essential. Early career counseling and clear pathways that balance structure with exploration can help students with this decision (Karp, 2013).

Building momentum in credit attainment is also crucial to increasing completion rates. Although students typically take a strong foundation of general education courses in their first year, particularly those who have been placed into developmental studies, studies have linked under-resourced students 'concentrating' in a program of study (concentrating defined as completing nine credit hours of program-related courses) within the first year with significantly higher completion outcomes (Jenkins & Cho, 2011; Jenkins & Weiss, 2011). Other researchers have suggested that merely increasing students' attempted credits within the first year, including increasing participation in bridge and other summer activities and encouraging students to move

from part-time to full-time enrollment, positively impact completion rates (Attewell & Douglass, 2014).

The guided pathways movement has helped dozens of community colleges improve their completion rates for all students, including under-resourced students. A guided pathways approach requires institutions to retool their academic and support services to achieve four primary goals: (1) develop clear academic pathways that map course sequences for every program, (2) help students choose a pathway early in their academic career, (3) keep students on their path through completion, and (4) ensure that students are learning (Association of American Colleges and Universities, 2019). Creating course sequence maps for programs encourages faculty to think about each degree's essential competencies and the optimal way for students to achieve them. In addition, the pathways approach builds in mandatory interactions with support staff, such as advisors, to ensure students are still following their educational plan. This directly benefits under-resourced and first-generation students, who are less likely to seek a service unless it is required – and they are aware that it is available (Karp et al., 2008). The guided pathways model has led to significant increases in completion rates at some institutions. City Colleges of Chicago, an early adopter of guided pathways in 2010, increased their IPEDS graduation rate from 7% in 2009 to 17% in 2015 (Fink, 2017).

Limited Employee Ability to Support Students who Experience Poverty

College can be difficult for students, but even more so for under-resourced students. Economically challenged students are often the first in their families to attend college, leaving them to feel isolated and unable to effectively navigate college structures to get the support they need. Compounding this are deficit-based stereotypes of students in poverty that faculty and staff may hold. Deficit ideology refers to beliefs that place the responsibility for inequitable outcomes solely on the disenfranchised rather than acknowledging the systems and structures that

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contribute to those outcomes (Gorski, 2011). Common deficit-based stereotypes of people living in poverty include beliefs that they are lazy, abuse drugs and alcohol, and do not value education (Gorski, 2012). Because these stereotypes have been socialized into the dominant culture, they can lead faculty to lower their expectations for students experiencing poverty (Gorski, 2012). Research has demonstrated that students feel the weight of these stereotypes in a way that can negatively impact their academic performance (Steele & Aronson, 1995).

Instructors may adopt a deficit perspective when informally assessing students (Milner et al., 2017). For example, an instructor might view a student who turns in their homework a few hours before class as a procrastinator and may feel like they would do a much better job with their work if they spent more time on their assignments. They may fail to consider that the student might lack access to the Internet or the technology at home that would allow them to complete their assignments on time. When faculty assess their students through a deficit-based lens, they do not acknowledge that students struggle to obtain the resources needed to have a successful academic career. Faculty who can recognize their deficit-based perspectives are better equipped to examine their implicit biases and reduce them. Boscardin (2015) recommends that faculty can reduce their implicit biases by increasing their self-awareness, working to develop or improve their empathy skills, establishing positive learning opportunities, and creating an inclusive learning environment. By reducing implicit biases and deficit perspectives, faculty can better identify and assist low-income students who need additional support services.

Colleges such as the Massachusetts Institute of Technology (MIT) have shared suggestions for faculty who seek to support under-resourced students. These suggestions include: (1) being an ally for students so that they feel comfortable opening up and sharing their experiences, (2) helping students feel that they belong, (3) helping them understand that failures are not debilitating, (4) aiding them in realizing what resources are available on campus to

support them and, (5) making appropriate referrals so that students can get the help they need (MIT, n.d.).

A causal system analysis allows scholar practitioners to analyze the causes that contribute to a problem of practice (Bryk et al., 2015). We met with a team of colleagues to brainstorm the causes of lower completion rates among under-resourced community college students. The team included six practitioners representing administrators, faculty, student affairs staff, and institutional research staff, each with professional experience ranging from a few years to more than two decades. The root cause analysis diagram (Ishikawa, 1976) in Figure 1 illustrates the causes contributing to low retention and low completion rates of under-resourced community college students and is a visual representation of those discussions. This tool, known as a fishbone diagram, includes 'bones' that represent major causes (Bryk et al., 2015). When viewed in its entirety, the diagram demonstrates that problems of practice are the result of multiple issues that exist within complex systems; no single reason is to blame (Bryk et al., 2015).

Figure 1

Ishikawa Fishbone Diagram
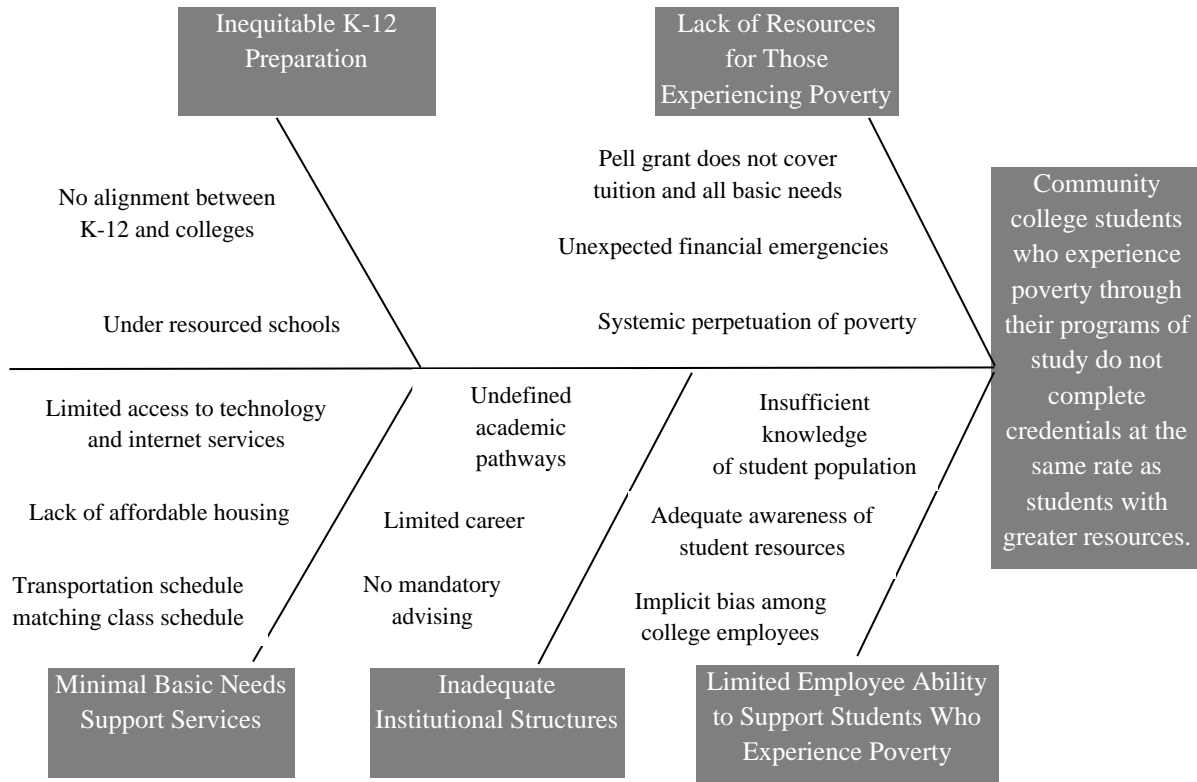
Note. List of causes that contribute to low retention and completion rates of under-resourced students in community colleges.

The Problem of Practice Within Local Context

A 2014 Opportunity Insights study ranked Charlotte, North Carolina, 50th out of the 50 largest metropolitan areas in the country in terms of upward mobility, noting that a child born into the lowest economic bracket in Charlotte had only a 4.4% chance of reaching the highest bracket (Chetty et al., 2014). As a result of the study, community government, business, and philanthropic leaders analyzed the Charlotte landscape and, in 2017, published their

recommendations for improving upward mobility. Their report identified three determinants likely to influence opportunity: early care and education, college and career readiness, and child and family stability (Charlotte-Mecklenburg Opportunity Task Force, 2017). The report also noted ingrained racial and classed segregation systems throughout Charlotte and Mecklenburg County that prevented equitable opportunity and created divisions within the community (Charlotte-Mecklenburg Opportunity Task Force, 2017). As the local community college providing career education and workforce development, Central Piedmont Community College (CPCC) can impact each of these influencers and, ultimately, drive upward mobility for its students.

Founded in 1963, CPCC is the 2nd largest community college in North Carolina. The College has six campuses and two centers located in Mecklenburg County. The school offers nearly 300 associate degrees, diplomas, and certificate programs that prepare students for the workforce or university transfer. Furthermore, over 800 partnerships have been formed with companies to provide workforce development and opportunities for apprenticeships and internships (CPCC, 2022). In addition to offering college credit programs, the institution provides corporate and continuing education and adult high school courses. Additionally, CPCC is home to more than 3,000 international students representing 152 countries (CPCC, 2022). During the 2017-2018 academic year, the College enrolled 27,105 students in degree, diploma, and certificate programs and 25,412 students in literacy and continuing education courses (CPCC, 2017). Fifty-seven percent are students of color, with Black (28%) and Hispanic (14%) students comprising the largest of these demographic groups (CPCC, 2017).

Nationally, community colleges struggle to graduate students at the same rate as four-year institutions, in part because the open admissions nature of most community colleges allows students with a wide range of educational goals and academic preparation to enroll. The National

Center for Education Statistics (NCES, 2019) lists CPCC's federal graduation rate of 18%

(defined as a first-time, full-time degree- or certificate-seeking students who complete their

credential within 150% of the "normal" time) and a transfer rate of 34%. While CPCC students

struggle to graduate, they also struggle to afford college. Nearly two-thirds (65%) of CPCC

students receive some form of financial assistance, primarily in Pell grants -- federal need-based

educational grants for students attending two- or four-year colleges and universities (NCES,

2019). During 2017-2018, 52% of CPCC students received $3.52 million in Pell grants (NCES,

2019). Because not all students complete the application for federal assistance, the percentage of

students receiving aid may be smaller than the percentage of those who might qualify for such

funding.

      As a large institution, CPCC is a complex organization consisting of and existing among

several complex systems. Open systems theory recognizes the multitude of complex systems

within an organization and the complex systems in the surrounding environment and how their

interconnectedness impacts the organization (Scott & Davis, 2007). Analyzing community

colleges using the open systems lens reveals how individual community colleges are composed

of groups of systems, are part of larger systems themselves, and are also dependent on external

systems to set direction and thrive. These systems, both internal and external, impact students as

they progress through CPCC. For example, CPCC is part of the more extensive North Carolina

Community College System (NCCCS), which (1) conveys statewide policies related to

admission, (2) sets tuition prices, and (3) approves academic programs. Although CPCC is

dependent on NCCCS for funding, NCCCS is also reliant on CPCC and other state community

colleges to collect tuition revenue and achieve the system's goals. CPCC is also dependent on

local industries to guide workforce needs, just as industries depend on the College to fill their

talent pipeline. The state university system also influences CPCC. CPCC is dependent upon

universities to provide the next level of education for its transfer students, just as universities are dependent upon this additional stream of incoming students. They also refer students back to community colleges when they cannot continue at the university for academic, financial, or disciplinary reasons.

Theory of Improvement

Implementing holistic support structures that include both academic and non-academic resources can positively influence community college students' likelihood of success, particularly for those experiencing the challenges associated with poverty. Increasing the number of under-resourced community college graduates improves these graduates' lifetime earnings, contributing to their social mobility and improving the community (Belfield & Bailey, 2011). *Our theory of improvement holds that embedding proactive, intentional, holistic supports that address under-resourced community college students' academic and basic needs within eight-week courses will result in higher course success rates, leading to improved retention and credential completion.* Research suggests three interventions that can lead to increased student success rates:

1. Compressed terms ranging from six to eight weeks.

2. Connecting students to institutional and community resources that can assist them in meeting their basic needs.

3. Providing proactive tutoring and academic support early in a course.

In the following literature review, we examine the theory of improvement.

Literature Review of Improvement Initiative

As part of a complex system, institutional structure plays an essential role in an institution's success. CPCC currently adheres to a traditional community college structure, which hampers student progress toward a credential. This structure, which researchers have referred to

as the "cafeteria model" (Bailey et al., 2015, p. 13), places the onus for wading through information about program choices, course requirements, and future career options on the student. Institutions with this model, including CPCC, have an overabundance of programs and options within programs, which can quickly overwhelm students as they struggle to determine which courses they need to progress toward degree completion. These colleges have few, if any, required interactions with advisors or other support staff who could help students navigate the college (Bailey et al., 2015). Students who need this support the most are least likely to seek it when it is not required (Karp et al., 2008). Researchers have critiqued the traditional model, noting that the lack of structure leaves students with too many options and too little support, and have challenged institutions to rethink how they serve their students (Bailey et al., 2015; Holzer & Baum, 2017).

Although unintended, the "cafeteria model" (Bailey et al., 2015, p. 13) advantages more affluent students over other groups, particularly under-resourced and first-generation students. While the open nature of student services at these institutions appears to increase access, it actually contributes to the reproduction of societal inequities by advancing those with cultural and social capital within the college setting (Karp et al., 2008). Students who know the potential benefit of a particular service, such as seeking out an advisor or taking a student success course, will opt into them (Scott-Clayton, 2011). Students who lack this knowledge are less likely to take advantage of these services unless required; this disproportionately impacts under-resourced and first-generation college students (Karp et al., 2008). Although CPCC includes equity as an institutional value, the lack of required support creates inequities. The current model benefits more affluent students and disadvantages the groups who need the support the most -- under-resourced and first-generation college students.

Embedded Support Models

A significant number of community colleges have replaced the "cafeteria model" (Bailey et al., 2015, p. 13) with innovative models that add the structured support under-resourced students need. These programs provide wraparound services for under-resourced students that assist them in navigating the institution, supporting them academically, and connecting them with community agencies, as needed. One of the most successful models of comprehensive support for under-resourced community college students is the Accelerated Students in Associate Programs (ASAP) initiative developed at the City University of New York (CUNY). The program targets relatively new students with financial needs who agree to full-time study in their academic program (Linderman & Kolenovic, 2013). ASAP students move through their program pathways as a cohort and are required to remain enrolled and to meet with their advisor at specific times, receive career development, and utilize academic support, such as tutoring (Linderman & Kolenovic, 2013). A study of the ASAP program found an increase in the 3- and 6-year graduation rates of 18% and 10%, respectively (Weiss et al., 2019).

The ASAP model's success has prompted institutions in other states to adopt similar comprehensive support programs for under-resourced students. In 2014, three Ohio community colleges implemented the Students Accelerated in Learning (SAIL) program, modeled after the ASAP program at CUNY (Headlam, 2018). Similar to the ASAP program, SAIL participants had to qualify for a need-based financial assistance program and agree to enroll full-time in an associate degree pathway. Students in the SAIL program were required to meet with their program advisors twice a month during their first semester (Sommo et al., 2018). Following that semester, advisors divided the students into groups according to their needs. Their advising requirement was adjusted accordingly (Sommo et al., 2018). In addition, students participated in required career development activities and tutoring sessions (Sommo et al., 2018). After two years of program implementation, 19% of the SAIL participants had earned a degree or

credential, compared to only 8% of the control group, further demonstrating the positive impact a comprehensive support program can have on completion rates (Sommo et al, 2018).

Compressed Terms

Although the traditional academic term ranges 15-16 weeks, a number of higher education institutions have increased success rates by offering courses in compressed terms. Compressed terms provide the same curricular content in an abbreviated format and range from as short as 3.5 weeks to as many as 10-12 weeks (Almquist, 2015). Spurling (2001) examined the relationship between the compression hypothesis (compressing content into a shorter duration of course) and the intensity hypothesis (students enrolling in multiple courses within the same subject). Although limitations in his data prevented him from determining which hypothesis was more effective, other researchers have found that shorter courses yield higher success rates (Green & Almquist, 2012; Almquist, 2015; Tanner, 2018). Tatum's (2010) review of literature addressing compressed courses found that little to no difference existed between the success rates of compressed courses and traditional length courses and where a difference was found, it benefitted students in the compressed courses. This difference was maintained across various populations. Pearce (2019) examined the relationship between course length and delivery method. The delivery methods examined included traditional face-to-face courses, hybrid courses that combine in-person learning with online instruction, and fully online courses. While the data showed no statistically significant difference among delivery methods, they did find higher success rates within eight-week courses.

In addition to improving success rates in grades, Logan and Geltner (2000) found that shorter courses improved outcomes outside of course grades. Their study of students at Santa Monica College compared the outcomes of students in compressed courses (both six- and eight-
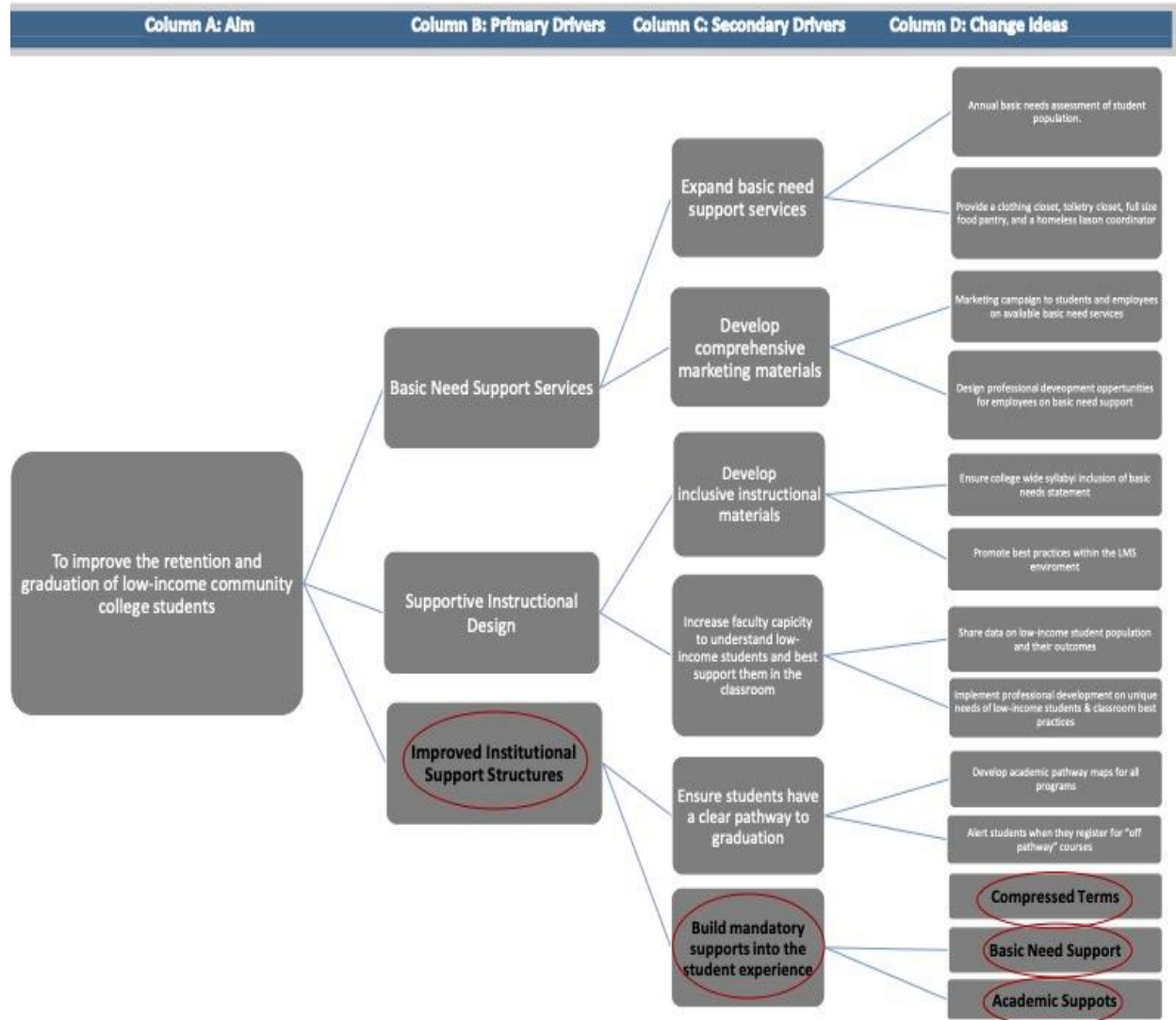
week courses) to those in traditional 16-week courses. In their research, which compared

students with a single instructor in the same course taken in six-week, eight-week, and 16-week

durations, they found that students in six-week courses had the highest success rate (over 90%).

In their study, they also determined that students in the compressed six-week course

demonstrated higher retention of knowledge. Logan and Geltner (2000) attributed a portion of

this success to the extreme mental focus required to complete courses of a shorter duration.

Figure 2 is a driver diagram (Bryk et al., 2015) that illustrates the factors that contribute

to increasing the retention and graduation rates of under-resourced community college students.

The "driver diagram is a tool for planning an improvement initiative and helps to define which

aspects of the system should be measured and monitored to see if the changes/interventions are

effective and if the underlying causal theories are correct" (Naima, 2016, p. 1340). For our

research, we focused on the drivers and changes in bold, black print: (1) improved institutional

support structures, (2) building mandatory supports into the student experience, and (3)

implementing holistic student support. To increase retention and completion rates among under-

resourced community college students, we implemented intentional, holistic supports embedded

within targeted courses offered as part of a degree program with eight-week compressed courses.

We theorized that combining the shorter course length with wraparound academic and basic

needs support increases student success rates within these courses, term to term retention, and

completion rates.

Figure 2

Driver Diagram

Column A: Aim	Column B: Primary Drivers	Column C: Secondary Drivers	Column D: Change Ideas

Note. Representation of the aim in relation to the primary drivers, secondary drivers, and change ideas.

After careful examination of the drivers impacting the retention and completion of under-resourced students, we focused on improving institutional structures. Although basic needs support was included in our improvement initiative, it was not the primary driver we selected, as our model incorporated structural changes to the delivery of the course. Unlike the other drivers,

institutional structures provided the opportunity to impact large numbers of students and address a wide variety of needs. The improvement initiative implemented at CPCC was a holistic support system providing intentional academic and basic needs resources within targeted eight-week compressed courses. For the purposes of our research, we operationalized the term "holistic" as a support model that "meets students where they are, addresses their individual needs, leverages their strengths, and focuses on student development and learning" (Achieving the Dream, 2018, p.7). Our initiative incorporated connecting students to wraparound services that included academic tutoring and basic needs supports, such as public benefits and emergency grants, into the structure of compressed, eight-week math courses. We hypothesized that this research-supported approach would increase the percentage of under-resourced students completing these courses, leading to improved credits and retention. For this improvement initiative, we defined under-resourced as a student's eligibility to receive some form of federal tuition financial assistance, such as a Pell grant or a work-study position.

Our improvement initiative provided a holistic support system that combined academic and basic needs support within math courses offered in an eight-week compressed term. We identified math as the targeted course because of the pivotal role successful completion of math can play in building student momentum toward graduation. Numerous studies have linked the completion of college-level math to increased levels of degree attainment (Calcagno et al., 2007; Leinbach & Jenkins, 2008; Roska & Calcagno, 2010). Despite this positive association, math success rates remain low at the developmental and college levels (Bailey et al., 2010). The probability of completing a degree increases as students finish introductory courses, including math (Calcagno et al., 2007). It follows then that increasing the success levels of college-level math courses will lead to increased numbers of graduates. Because all degree programs at CPCC require completion of a math course, sections of math courses were more likely to include a

representative sample of students from across all academic programs. We selected MAT-171 Precalculus/Algebra as the course in which to implement our intervention. MAT-171 is a college-level math course that can be used to satisfy CPCC's general education requirement for mathematics. In addition, the course transfers to four-year colleges and universities in North Carolina, where it will also satisfy a general education requirement for mathematics. Although the course is required for many programs and is a popular transfer option, it is a challenging course that many students struggle to complete.

Improvement Design

Insider Research

When designing an improvement initiative, it is important for researchers to understand where bias, assumptions, or other factors may affect the process. Each of us is an administrator at CPCC with ties to various components of our initiative. Although Dena Shonts currently serves as the Executive Director for the College's Cato Campus, she previously held the role of Associate Dean for Student Engagement and had supervisory responsibility for the Single Stop Office, the department charged with connecting CPCC students to basic needs and financial support in the community. As the Associate Vice President of Academic Affairs - Academic Support, Amy Bruining provides leadership for the Academic Learning Center, CPCC's tutoring center. As professionals, we have built trust with our colleagues. As inside researchers, however, we did not want to confound this improvement initiative because of the administrative nature of our roles. We acknowledged the influence of power within this dynamic and continuously worked to mitigate it through intentional self-reflection.

As a team of two scholar-practitioners, we divided the work of this improvement initiative into a manner that is equitable and maximizes the strengths of each individual. We worked together as much as possible, jointly crafting agendas and co-leading the design team

meetings. Amy worked with the math division to identify appropriate sections to target and took

the lead in coordinating tutoring staff within the Academic Learning Center. Dena took the lead

in coordinating staff in the Single Stop Office. Dena took the lead on coordinating the student

focus groups, and Amy took the lead on coordinating the faculty and staff focus groups, although

she did not attend the focus group that included Academic Learning Center staff due to the

possibility that her presence could have discouraged the staff from being completely open. We

performed the data analysis together to ensure the consistency and accuracy of the methods.

Design Team

The design team for our improvement initiative was composed of key administrators and

staff from different areas across the College (i.e., Academic Affairs, Student Affairs,

Organizational Strategy and Excellence, and Institutional Advancement). Each team member

brought strategic knowledge and experience to contribute to implementing the initiative. In

addition to us, the design team included two Single Stop Office Coordinators, Director of the

Academic Learning Center, a Math Coordinator within the Academic Learning Center,

Executive Director of the Center for Teaching and Learning Excellence, Associate Dean of

Math, and the Assistant Director of Data Visualization and Analytics within the College's Office

of Institutional Research. Jess-Mara Jordan and Tiffany Martin, Single Stop Coordinators, have

been in their roles for three years. Jess-Mara and Tiffany have successfully worked with

hundreds of students, connecting them to basic need support services. Florence Patterson,

formerly the Director of Academic Learning Center, has worked at CPCC for nearly 20 years in

various academic and student support roles. Just prior to implementation of the intervention,

Florence took a new position within the College as the Executive Director of College and Career

Readiness, the academic area responsible for literacy and high school completion courses. In her

former role as the Director of the Academic Learner Center, she hired tutors, coordinated and

promoted services, and ensured that virtual and in-person tutoring services were available to serve all students. Bionca Shields, a Math Coordinator in the Academic Learning Center, provides math tutoring, classroom orientations, and virtual account set-up assistance. Dr. Shantell Strickland-Davis, Executive Director of the Center for Teaching and Learning Excellence, has served the College for over 10 years and provides virtual and in-person faculty development opportunities. Jordan Bertke, Associate Dean of Math, determines what math courses will be offered, the modality in which they are provided, the length of the course, and assigns instructors to their classes. Nataya Lewis, Assistant Director of Data Visualization and Analytics, works with partners across the College to provide needed data. Each design team member was invited to participate because of the unique perspective their positions would bring to our work, their passion for increasing success for all students, and their intimate knowledge of various facets of the student experience at CPCC. The design team served as a network of individuals who framed the problem of practice, dissected the complex causes, and worked collectively to design, implement, and evaluate continuous improvement (Bryk et al., 2015).

Improvement Methodology

Improvement Science

Improvement science provides a sound methodology for dissecting the numerous intertwined causes and identifying change ideas that can positively increase the graduation rates of low-income students at CPCC. Rather than study the problem through the control and experimental groups of traditional research design, improvement science enables us to use inductive and deductive inquiry to identify the high-leverage drivers within the existing system that are likely to produce improvement, take action quickly, and then scale those changes in order to benefit all students in the targeted population (Bryk et al., 2015). According to Bryk et al. (2015) improvement science is centered around six core principles:

1. Using key stakeholders early in the process and often, to determine the problem you are trying to solve.

2. Focus on what works, for whom and under what set of conditions does it work.

3. Understand the system, how local conditions shape work processes.

4. Anticipate unintended and intended consequences. Embed key outcome measures and process to determine change.

5. Use multiple cycles of Plan, Do, Study, Act (PDSA) in disciplined inquiry to learn and quickly improve. Learning from one cycle to the next is key.

6. Utilize your networks to accelerate improvements.

The cyclical nature of improvement science is similar to that of grounded theory. With degree completion being a "lagging measure" (Hinnant-Crawford, 2019, p. 52), where years may pass before an impact is validated, improvement science is a key methodology because it requires practical, short-term measures that assist practitioners in determining if their change is likely to produce the desired outcome over the long term (Hinnant-Crawford, 2019). Improvement science combines the knowledge gained through root cause analysis, current research in the field, and expert scholars and practitioners', making it the strongest method for increasing retention and completion rates of low-income students (Bryk et al., 2015).

Improvement Initiative

With the improvement initiative, we implemented a holistic student support system embedded within math courses offered in a compressed eight-week session. The holistic system consisted of two primary supports: academic support and basic needs support. Academic support was provided in the form of tutoring through the Academic Learning Center. The Academic Learning Center offers tutoring in a variety of disciplines, including math, and helps students develop the academic skills they need for academic success (CPCC, 2020a). Basic needs support

was offered through the Single Stop Office. Single Stop provides students with wraparound support services, including connection to public benefits, tax preparation, financial education, legal services, emergency grants, food, and referrals to community agencies, so that they can focus on their academics and successfully achieve their goals. Single Stop services are free services for students and their families (CPCC, 2020b).

Math instructors in the targeted sections incentivized students to complete the Single Stop Office's benefits screener by offering extra credit. Single Stop staff then followed up with students to connect them to financial resources that supported their basic needs. In addition, math instructors offered extra credit to students who created an online account with the Academic Learning Center. A math tutor in the Academic Learning Center was embedded in the course and offered tutoring services. The instructors shared their course pacing guides with the Academic Learning Center so that the tutor would know exactly what was being covered at each point of the term. She also strategically scheduled group tutoring sessions in advance of all tests.

We anticipated that the combination of these supports would lead to an increase of success rates (A-C grades) in the eight-week math courses and in the retention of students in those math courses to the following term. Figure 3 provides a graphic representation of the improvement initiative design. These wraparound supports were provided to students enrolled in targeted eight-week sections of MAT-171 Precalculus/Algebra during the fall 2021 term.

Figure 3

Improvement Initiative Model
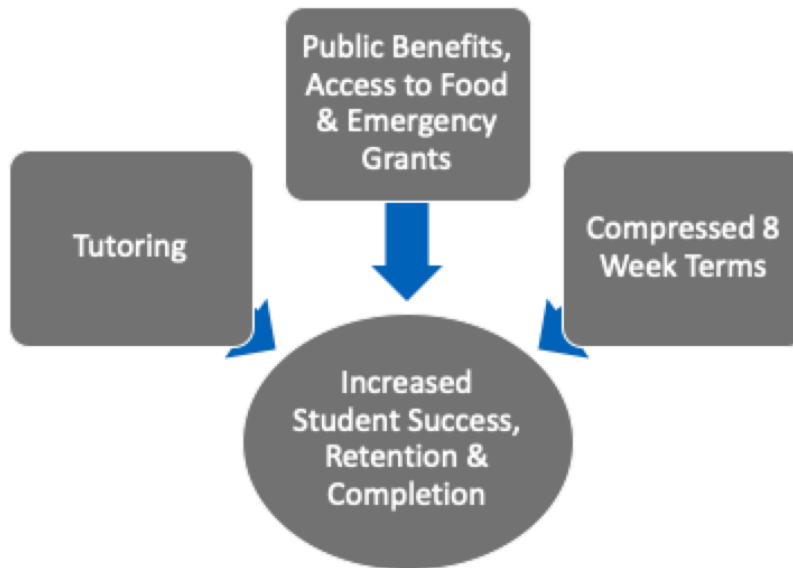
During the spring 2021 term, CPCC began a phased implementation of the Conquer Forward initiative. Conquer Forward was designed to alter course offerings in a way that accelerated student momentum while maintaining high levels of learning. CPCC currently offers courses in various lengths – traditional 16-week full-semester courses, 12-week courses, 10-week courses, eight-week courses, and four-week courses. After examining the success rates of students in each of these course lengths and reviewing research-supported models at other institutions (Sheldon & Durdella, 2010; Gamboa, 2013), College leaders decided to pilot shifting the majority of courses to eight-week sessions, essentially creating two eight-week sessions during fall and spring, each separated by a short break, and one summer session. Approximately 12 programs began implementing Conquer Forward in spring 2021 with their newly enrolled students. Because nearly all sections will eventually be offered in the eight-week format, we selected courses within this pilot for our intervention.

The ultimate aim of this intervention was to increase the degree completion rates of under-resourced students and to reduce the equity gap that exists between the graduation rates of under-resourced students and better-resourced students. Because completion rates are a lagging measure and years may pass before an improvement is observed, benchmark goals were identified for this intervention.

Benchmarks:

1. The number of students earning successful grades (A-C grades) in eight-week sections of MAT-171 will increase by 5% from the baseline sections to the sections with embedded support.

2. The number of students enrolled in eight-week sections of MAT-171 and then retained to the following term will increase by 5% from the baseline sections to the sections with embedded support.

These benchmark goals were defined based on literature establishing academic performance and student retention as metrics for student success. York et. al (2015) conducted a thorough review of how literature operationalized the construct of 'academic success' and found that academic achievement via course grades and GPA remains the dominant outcome measured. Although researchers acknowledge the variety of factors and experiences that contribute to and influence academic performance, course grades persist as a primary measure of student achievement and progression (Kuh et. al, 2006; York et. al, 2015). For this research, we defined successful grades as grades of A, B, or C, as grades lower than C do not transfer to colleges and universities, do not meet prerequisite requirements for more advanced courses, and can negatively impact a student's ability to maintain the minimum grade point average required to remain in good standing with the College.

Students' ability to persist from one term to the next is a crucial component of increased completion and graduation rates. Student retention is complex and has been defined in multiple ways (Hagedorn, 2005). Retention of students from their first semester to their second semester and from their first year to their second year are widely used to measure student momentum toward completion of an academic program and graduation (Adelman, 2006; Baldwin et. al, 2011; York et. al, 2015). For this research, we defined retention as students who enrolled at CPCC for the term immediately following their MAT-171 course. The use of term-to-term retention can be somewhat limiting because students, particularly those who face the challenges associated with poverty, may temporarily stop out and re-enroll at a later time (Terriquez & Gurantz, 2014). Students who maintain continuous enrollment, however, build credit momentum faster and graduate at higher rates (Belfield et. al, 2019). Although some definitions of retention include a student's enrollment status (full-time or part-time), we did not consider the number of credits for which a student registered as a factor and considered a student to be retained if they enrolled in any courses. As completion of an academic program is the ultimate aim of this research, we also included students who graduated in the percentage of students who were retained.

Implementation Plan

The design team selected the specific math sections within the Conquer Forward pilot where students received holistic support. The first component of this approach included connecting students to the Single Stop Office's services. Single Stop helps students meet their basic needs by connecting them to campus and community resources (CPCC, 2020b). Students in Single Stop complete a benefits screener that informs them of their eligibility for public benefits and community resources that may help with rent, utilities, childcare, or other financial obligations. In addition, Single Stop connects students with college resources, such as campus

food pantries and emergency grants. Our improvement initiative connected students to Single Stop services at the onset of each course via the syllabus and announcements within the learning management system, Brightspace. Instructors offered additional points to students for completing the benefits screener. The Single Stop Office provided instructors with confirmation of students who completed the benefits screener, although they did not share the screener's results. The Single Stop staff then worked with the students to connect them to needed resources. All students in the targeted sections were incentivized to visit Single Stop to prevent singling out low-income students who may have a greater need for support than other students.

The second component of the improvement initiative provided academic support to students in the targeted sections. CPCC's Academic Learning Center provides in-person and virtual tutoring in a variety of subject areas (CPCC, 2020a). Currently, instructors refer students for tutoring after they notice them struggling in their course and students must take the initiative to contact the Academic Learning Center to schedule time with a tutor. Not all students who are referred to the Academic Learning Center follow through and schedule a session. Due to the compressed nature of the courses included in our improvement initiative, valuable time would have been lost if the referral was not made until the student struggles. Instead, instructors in the improvement initiative sections referred all students for tutoring at the beginning of the course. This allowed the Academic Learning Center to proactively contact the students to offer tutoring opportunities. As with the Single Stop component, all students in the targeted courses were incentivized to seek assistance through the Academic Learning Center.

Following the approval of our proposal from the Institutional Review Boards of both Western Carolina University and CPCC during late spring 2021, the design team convened to begin our work. We met with the design team members to confirm their participation and endorsement that this was a relevant problem of practice at CPCC. The group reviewed the

causal analysis to determine that the selected driver and proposed intervention were appropriate for addressing the problem. The team then finalized the implementation plan.

Figure 4 provides the actual timeline for implementation actions and evaluations throughout the improvement initiative. In our original implementation timeline, we had proposed to begin our intervention during mid-spring of 2021 but were unable to do so due to a lengthy IRB process and external factors affecting CPCC. (Further details on the external factors affecting CPCC are provided later in the disquisition.)

Figure 4
Implementation Timeline

Timeline of Implementation Action Steps	June	July	August	September	October	November	December
(Step 1) Create Design Team & establish regular meeting schedule. Team leaders build capacity of Design Team to conduct improvement process.	◆						
(Step 2) Design Team identifies problem of practice; conducts causal analysis; researches improvement initiatives to address problem of practice; selects and designs an intervention; designs implementation plan; and determines measures for assessing the intervention's outcomes and the development of the improvement process.	◆						
(Step 3) Design Team coordinates academic and holistic supports for targeted eight-week math sections.		◆					
(Step 4) Collect formative data on student usage of academic and holistic supports in targeted math sections during eight-week term.			➡				
(Step 5) Following completion of the classes, collect and analyze summative data, including grade/retention metrics, and conduct focus groups.			➡				
(Step 6) Determine what changes, if any, are needed for the next cycle of eight-week math sections.					◆		
(Step 7) Design Team coordinates academic and holistic supports for second cycle eight-week math sections with any changes recommended as a result of the first PDSA cycle.						➡	
(Step 8) Collect formative data on student usage of academic and holistic supports in targeted math sections during second cycle eight-week term.						➡	
(Step 9) Following completion of the classes, collect and analyze second cycle summative data, including grade/retention metrics, and conduct focus groups.							◆

Note. This figure represents the actual timeline that was implemented in the intervention.

Impacts of COVID-19

In March of 2020, the Coronavirus, better known as COVID-19, caused a worldwide pandemic, forcing community colleges around the country to adjust the modality of their course offerings. College courses that were typically offered in a variety of formats were now primarily offered in an online setting. As we planned for the implementation of this intervention, we hoped (1) that the pandemic would have largely passed by the start of fall 2021, the proposed term for implementation of the intervention; (2) that classes would be held in person again; and (3) that students would be excited to come back on campus. Unfortunately, this was not so, as the Delta variant of the virus surged in late summer 2021, and the impacts of COVID-19 continued to be felt throughout the implementation term.

COVID-19 further highlighted inequities such as food insecurities, access to technology, and other critical resources (Hope, 2020). In 2021 The Hope Center conducted a #realcollege survey to assess needs insecurities in college and university students during the ongoing pandemic. Approximately 200,000 students from 202 higher education institutions in 42 states completed the survey (The Hope Center for College, Community, and Justice, 2021). The results were startling. The survey results indicated that 68% of students are facing food insecurities, 48% are housing insecure, 14% are homeless, 35% are experiencing anxiety, 41% had a friend or family member who was sick with COVID-19, and 13% lost a loved one to COVID-19 (The Hope Center for College, Community, and Justice, 2021). Figure 5 depicts the results of the #realcollege survey.

Figure 5

Basic needs, technology, and critical resource insecurities among college students
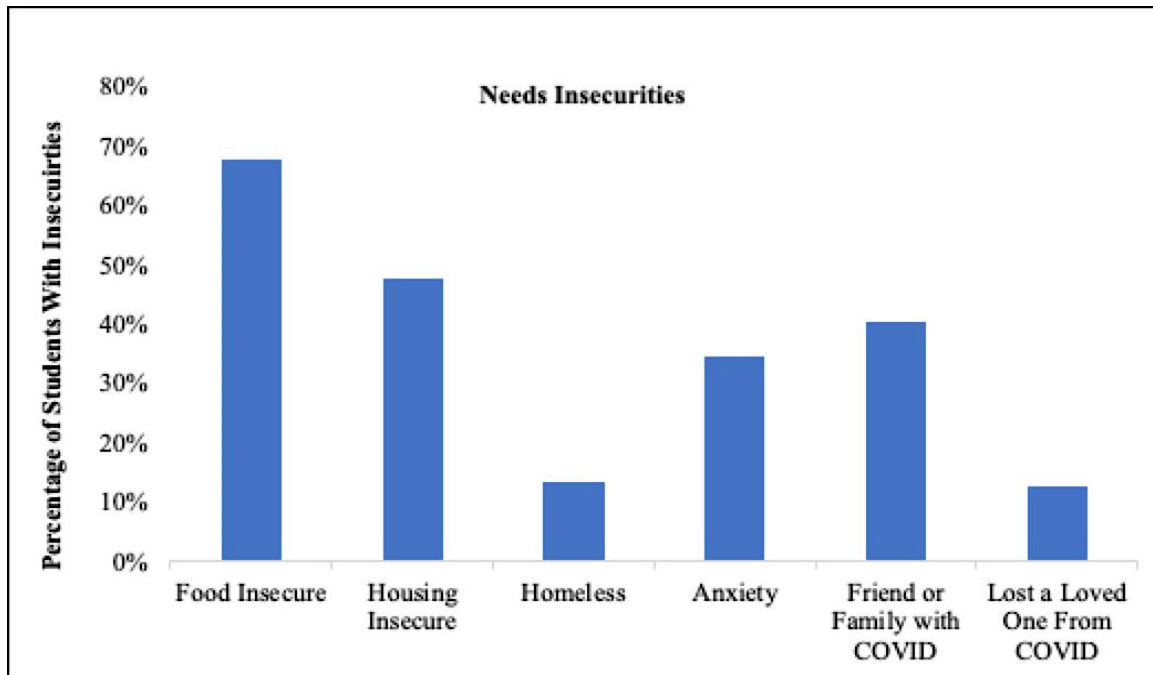
With COVID-19 outbreaks continuing to occur and the mask mandates still in effect, the demand for online classes remained high for the fall 2021 term. Although we had intended to pilot our intervention in seated course sections, the eight-week compressed sections of our targeted course were only offered via online instruction during our implementation term. As a result, we pivoted and implemented our intervention in a fully online course format. Knowing that students were facing multiple challenges during the pandemic, we looked at this as an opportunity to ensure that students were connected to the College's support services.

Initially, we planned for representatives from the Academic Learning Center and the Single Stop Office to conduct in-person orientations for the students in courses included in the pilot. As part of the orientation, the Academic Learning Center representative would help each student set up an online tutoring account and the Single Stop Office representative would have

each student complete a benefits screener. As classroom orientations were no longer an option, students were provided informational videos and written communication through emails and their learning management system, Brightspace, on creating a tutoring account and completing the benefits screener.

Participants

The sample for this intervention included 245 students enrolled in eight-week sessions of MAT-171 Precalculus/Algebra during the fall 2021 term. The first PDSA cycle included 58 students enrolled in two sections of MAT-171 and the second PDSA cycle included the 187 students enrolled in seven eight-week sections of MAT-171. One of the reasons that we selected a math course was that all academic programs at CPCC require a math course, which would likely make our sample more representative of the College's overall curriculum. Table 2 compares the demographic composition of the research sample to CPCC's curriculum student population and demonstrates that our research group was representative of our total student population.

Table 2

Comparison of Research Sample to CPCC Curriculum Population

		Curriculum College Population	Research Sample
Gender	Female	55.6%	55.5%
	Male	44.4%	44.5%
Race/Ethnicity	American Indian or Alaskan Native	0.5%	0.4%
	Asian	5.7%	8.6%
	Black	27.6%	34.7%
	LatinX	15.1%	9.8%
	Pacific Islander	0.2%	0.00%
	Two or More Races	3.2%	0.00%
	White	43.6%	42.9%
	Unknown	4.1%	3.7%
Age	< 21	49.4%	67%
	21 - 30	35.0%	26.9%
	31 - 40	8.7%	4.7%
	41 - 50	4.3%	1.4%
	51+	2.6%	0.0%

Note. The Planning and Research Office at Central Piedmont Community College regularly tracks the demographic information of students. CPCC data is from End of fall 2019, by Office of Institutional Research, 2020 (https://www.cpcc.edu/sites/default/files/2020-03/planning-and-research-enrollment-bulletin-fall-2019.pdf)

As the purpose of this intervention was to improve outcomes for under-resourced students, it was critical that they be represented in the research sample. Approximately 65% of CPCC students receive some form of federal financial aid (NCES, 2019). For the purposes of this research, we defined under-resourced as a student who was eligible for federal financial aid, such as a Pell Grant. Based on this definition, 63.7% of our sample were classified as 'under-resourced,' a figure similar to that of the overall population.

Formative Evaluation of Improvement Methodology

Plan-Do-Study-Act Cycles

Improvement science uses the Plan-Do-Study-Act (PDSA) cycle as a framework for inquiry (Langley et al., 2009). Through inductive and deductive inquiry, PDSA cycles enable researchers to guide continuous improvement through repeated phases of inquiry, strategic implementation, data collection, and amended future action based on results (Langley et al., 2009). Multiple PDSA cycles allow researchers to quickly and continuously use data collected through practical measures to adjust processes and practices to maximize the outcomes of the change idea. These practical measures also help researchers determine whether their interventions result in changes and if those changes constitute an improvement (Langley et al., 2009). For our improvement initiative, we used a mixture of qualitative and quantitative data collection methods. These methods included practical measures of outcome, driver, process, and balancing measures (Hinnant-Crawford, 2020). Our formative evaluation included driver, process, and balancing measures. Our summative evaluation includes outcome measures. Figure 6 provides an analysis matrix that outlines each of the measures and their method of analysis.

Figure 6
Improvement Science Matrix of Analysis

Improvement Effort	Type of Measure	Type of Data Collected	Frequency/ *Threshold for Intervention Modification*	Analytical Strategy/Data Displays
AIM: To improve the retention and graduation rates of under-resourced community college students **Improvement initiatives - Embedded academic support (tutoring) and holistic (basic needs) support within math courses**	Outcome	Course Grades	End of term	Independent sample *t*-test
		Withdrawal Rates	End of term	Independent sample *t*-test
		Retention to the Following Term	Beginning of the next term	Independent sample *t*-test
	Driver	Student Interviews to determine student perceptions of support	End of term	Deductive Coding
		Faculty/Staff Interviews to analyze the intervention	End of term	Deductive Coding
	Process	Usage statistics of tutoring	Weekly/*<35%*	Descriptive statistics Run chart
		Usage statistics for Single Stop	Weekly/*<25%*	Descriptive statistics Run chart

	Balancing	Syllabus/ Course Outline	Beginning and end of the semester	Document analysis

Note. This figure demonstrates the analytical strategy used in our outcome, driver, process, and balancing measures.

Driver Measures

Driver measures assess elements of change that indicate whether the initiative has resulted in an improvement (Hinnant-Crawford, 2020). Our theory of improvement holds that students who use embedded support services will increase their success within the course; therefore, our driver measures will measure the extent of that support. We measured support by conducting interviews of randomly selected students from the targeted sections and with the faculty who taught the courses, staff from Single Stop, and the tutors from the Academic Learning Center who provided the support. Appendix D includes student interview questions, and Appendix A provides faculty and staff interview questions. All students who were interviewed volunteered on their own accord and were recruited using emails and announcements in the learning management system, Brightspace. Appendix B includes an example of the recruitment email. The interview techniques included semi-structured and open-ended questions that allowed the participants to share their experiences in their own words (DeCarlo, 2018). The role of the student interviews was to gauge whether students felt more supported overall in the targeted class than in other courses. In addition, we conducted interviews with the faculty, tutors, and Single Stop staff to review the intervention following each PDSA cycle and to make recommendations for improvement during the subsequent cycle. Interviews were selected as a data collection method for this driver because they allow the participant to

provide detailed information related to their experiences (Creswell & Guetterman, 2012). Each interview was transcribed verbatim and analyzed using deductive, manual coding (Saldana, 2009).

Process Measures

Process measures assess the fidelity of an intervention's implementation and ensure it is being enacted as proposed (Hinnant-Crawford, 2020). Monitoring the percentage of students who utilize academic support would inform us as to whether or not students are accessing the support services as intended. The threshold for intervention modification for tutoring usage was set at 35%, meaning that if fewer than 35% of targeted students seek tutoring services each week, we would revise the initiative in a way that increased the number of students utilizing that service. Similarly, if fewer than 25% of targeted students access Single Stop each week, we would make a modification. The threshold for modification was slightly lower for Single Stop, as some of their services connect them to resources that may not need to be used weekly. Process measures were then analyzed using descriptive statistics, specifically run charts. Run charts allowed us to see the usage of each service over the length of the eight-week compressed term.

Balancing Measures

When implementing an improvement initiative, balancing measures are used to ensure that other system elements are not unintentionally impacted (Hinnant-Crawford, 2020). With the change in course length and academic content compression, the course objectives and academic rigor must not be sacrificed. Each course includes a signature assignment that should be the seminal assessment for that course and should be consistent across all sections. In addition, CPCC has a standard syllabus template that is tailored within each discipline and course. Regardless of the course's delivery method or length, sections of the targeted courses should have consistent course objectives and signature assignments. Analyzing course syllabi from the

treatment sections and baseline sections through document analysis ensured that content, course objectives, and signature assignments remained consistent throughout the intervention. Document analysis, a form of qualitative research, allowed us to interpret the documents with voice and meaning (Bowen, 2009).

Formative Evaluation Results and Responses

Driver Measures

To understand how embedding support services into eight-week compressed math courses impacted student success, interviews were conducted with randomly selected students from the first and second PDSA cycles and the faculty and staff who implemented them.

Student Interviews

Upon completion of the first PDSA cycle, students who completed the treatment courses were sent an email inviting them to provide feedback on their experience through interviews. We informed the students that participation in the interviews was voluntary and that there were no repercussions if they chose not to participate. Students were asked to email Dena if they were interested in providing their feedback. If a student chose to participate in an interview, they were provided with a $10 Amazon gift card. Some of the things we hoped to learn from the student interviews included (1) degree of usage of embedded support services, (2) type of experience the student had with the embedded support services, (3) impact of services on their course success, and (4) the future of embedded support services. As with the first PDSA cycle, upon completion of the courses in the second PDSA cycle, students were sent an email inviting them to contact Dena if they were interested in providing their feedback through an interview. After the first PDSA cycle five students volunteered to be interviewed, during the second PDSA cycle seven students volunteered to be interviewed.

Having identified the goals of the interviews, deductive coding was used when analyzing the interview responses from both PDSA cycles. We were careful to avoid bias by focusing on all of the responses so as to not miss any emerging themes (Medelyan, A. (2021, September 23). The following themes emerged from the data during the first and second PDSA cycles. The themes as seen in Tables 3 and 4 are: (1) services, (2) experience, (3) success, (4) embedded support, and (5) gratitude. In the first and second PDSA cycles the students who utilized one or both support services had a positive experience using the services and felt that they contributed to success within the course. Additionally, students felt that support services should be embedded in the course and they were grateful that the College provided these opportunities.

Table 3

PDSA Cycle 1: Student Interviews

Code	Description	Number of Occurrences
Services	The number of students who sought out Single Stop and or Academic Learning Center services.	4
Experience	The number of students who had a positive Single Stop and or Academic Learning Center experience.	4
Success	The number of students who felt that Single Stop and or the Academic Learning Center contributed to their success in the course.	4
Embedded supports	The number of students who felt that Single Stop and Academic Learning Center supports should be embedded in the course.	4
Gratitude	Students were grateful for the support the CPCC provides.	3

Note. Five students were interviewed during the first PDSA cycle.

Table 4

PDSA Cycle 2: Student Interviews

Code	Description	Number of Occurrences
Services	The number of students who sought out Single Stop and or Academic Learning Center services.	5
Experience	The number of students who had a positive Single Stop and or Academic Learning Center experience.	4
Success	The number of students who felt that Single Stop and or the Academic Learning Center contributed to their success in the course.	5
Embedded supports	The number of students who felt that Single Stop and Academic Learning Center supports should be embedded in the course.	5
Gratitude	Students were grateful for the support the College provides.	6

Note. Seven students were interviewed during the first PDSA cycle.

Faculty and Staff Interviews

Through the faculty and staff interview process, we hoped to determine (1) how much experience the faculty and staff had in higher education, (2) how often they reminded the students of the embedded support services, (3) when their students sought out services, and (4) if they believed that students would be more successful if they used the support services. The faculty who agreed to pilot the embedded support services and the staff who agreed to provide

49

the services during the first and second PDSA cycles had decided to participate in an interview upon completion of their course.

Deductive coding was again used to analyze the interview responses from both PDSA cycles. Once again, we avoided bias by focusing on all emerging themes. The themes that emerged in both the first and second PDSA cycles can be seen in Tables 5 and 6. They include (1) experience, (2) reminders, (3) incentives, (4) beginning of the term, and (5) success.

Although the emerging themes from the faculty and staff interviews remained consistent, we felt that the second PDSA cycle could be improved by increasing the number of reminders students received about the embedded support services. In the first PDSA cycle, the faculty reminded the students of the services at the beginning and in the middle of the course. In the second PDSA cycle, students were reminded of the support services every two weeks. Additionally, in the second PDSA cycle, we asked faculty to discuss the support services with their students at the beginning of the course. The increase in the number of students who sought out services at the beginning of the term during the second PDSA cycle can be attributed to the instructor discussing the supports at the beginning of the term and consistently reminding students to take advantage of them. Furthermore, the number of instructors offering incentives for utilizing support services increased during the second PDSA cycle. See Tables 5 and 6.

Table 5

PDSA Cycle 1: Faculty and Staff Interviews

Code	Description	Number of Occurrences
Experience	At least 3+ years of experience in the role.	3
Reminder	How often the students were reminded of the support services.	2

Incentives	Offering incentives to students for utilizing the support services.	2
Beginning of term	When students sought out services.	2
Success	Students who utilized embedded supports were more successful.	4

Note. Four faculty and staff members were interviewed during the first PDSA cycle.

Table 6

PDSA Cycle 2: Faculty and Staff Interviews

Code	Description	Number of Occurrences
Experience	3+ years of experience in the role.	4
Reminder	How often the students were reminded of the support services.	4
Incentives	Offering incentives to students for utilizing the support services.	6
Beginning of term	When students sought out services.	5
Success	Students who utilized embedded supports were more successful.	4

Note. Four faculty and staff members were interviewed during the first PDSA cycle.

Process Measures

The design team members from the Academic Learning Center and Single Stop tracked the students from the pilot courses who used their services, as well as the number of times they

were used. Run charts were created to depict the number of students who utilized the Academic

Learning Center and Single Stop services for each PDSA cycle. Run charts are a form of

descriptive statistics that monitor trends, patterns, and variations in data (Anhoej, 2018).

Tables 7 and Table 8 depict the run charts for Single Stop and the Academic Learning Center

usage during the first PDSA cycle. Table 9 and Table 10 display the run charts for Single Stop

and the Academic Learning Center usage during the second PDSA cycle.

Figure 7 shows a run chart for Single Stop usage during the first PDSA cycle. The chart

indicates that most students utilized Single Stop services at the beginning of the course, with

most students accessing the service during the first three weeks of the course. Single Stop

information was shared with students during the first week of the course and it was during the

first few weeks when its usage was incentivized. The usage of Single Stop services early in the

term suggests that students may have accessed those services after the instructor incentivized it,

but then did not return. Because Single Stop connects students to community resources for which

they are eligible, it is possible that students found the financial assistance they needed during the

first visit and did not need to access the services during the remainder of the course. The overall

usage of the service, however, remained fairly low throughout the course.

Figure 7
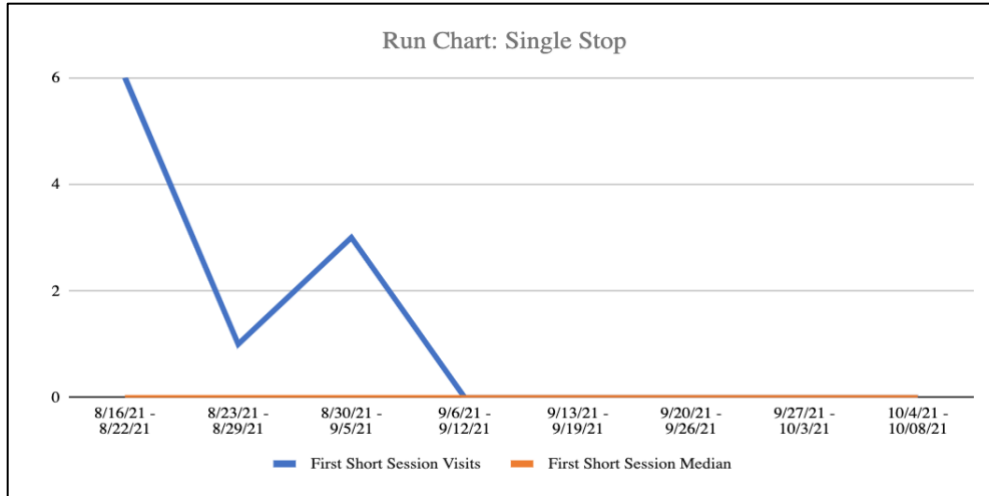
PDSA Cycle 1: Single Stop Usage

Figure 8 depicts the usage of the Academic Learning Center during the first PDSA cycle. Although the use of the Academic Learning Center was incentivized at the beginning of the course, similar to when the use of Single Stop services were incentivized, the run chart indicates that most students used the Academic Learning Center services during the second half of the course. Since math course content builds through the term, with later concepts requiring a firm understanding of the areas covered during the first few weeks, heavier usage during the second half of the term. The two peaks in usage corresponded to the weeks when students were expected to take their second and third of four tests in the course. It follows then that greater numbers of students would seek tutoring in preparation for a test. As with Single Stop, however, overall usage throughout the course was low.

Figure 8

PDSA Cycle 1: Academic Learning Center Usage

Run Chart: Academic Learning Center
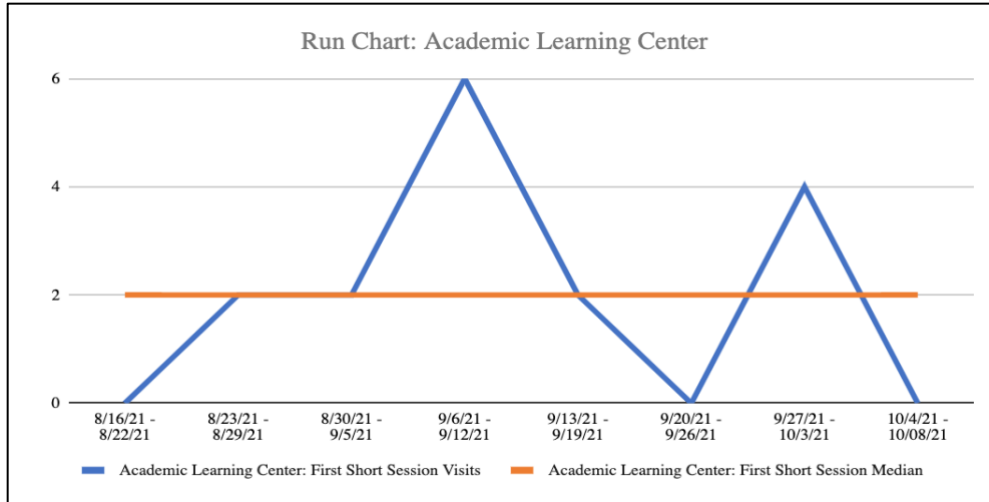
At the end of the first PDSA cycle, we reviewed available data to determine if there were changes that could be made for the second PDSA cycle that would generate greater student usage of the support services and potentially lead to greater improvement. After meeting with the faculty and staff involved in the first PDSA cycle and selected members of the Design Team, we decided that we would make a few small changes. The tutor from the Academic Learning Center increased communication efforts, particularly at the beginning of the term and in advance of tests. In addition, instructors drew more attention to the incentive for accessing the services. In addition, one instructor required his students to create their tutoring account as part of an assignment during the first week of the course. We hoped that this would better familiarize students with the Academic Learning Center and its services, making it easier to schedule tutoring appointments if they struggled with course content.

Figure 9 shows a run chart of Single Stop usage during the second PDSA cycle. As with the first cycle, usage of services was highest during the first week of the course. In fact, no students accessed Single Stop services after the second week of the course. Although a larger number of students used the service during the second PDSA cycle, the percentage of students

who used the service remained comparable to the percentage of students who used the service during the first PDSA cycle. Again, it is possible that students who used Single Stop early in the course were connected to resources that met their needs and did not need to return for an additional visit.

Figure 9

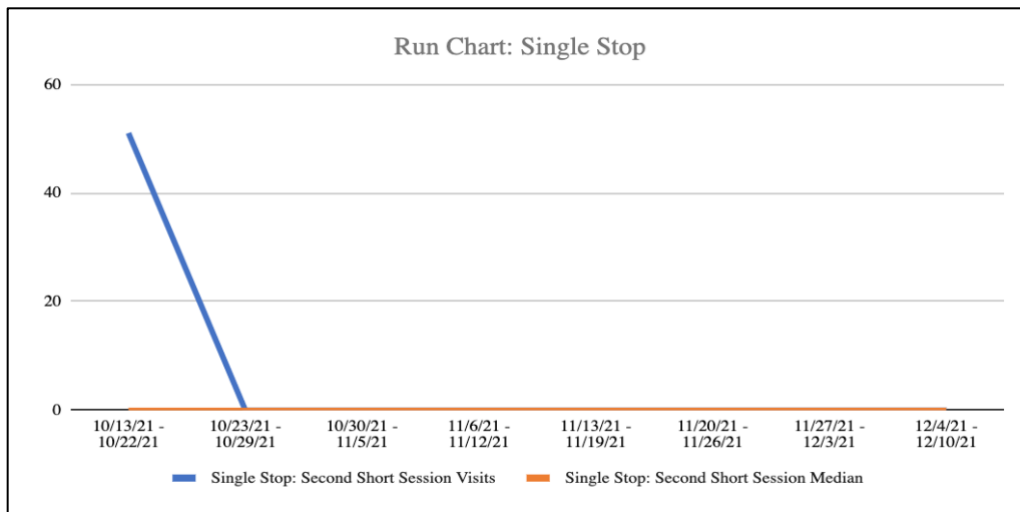**PDSA Cycle 2: Single Stop Usage**

Figure 10 depicts the usage of the Academic Learning Center during the second PDSA cycle. Unlike during the first PDSA cycle when usage was highest during the second half of the course, usage during the second PDSA cycle was highest during the first week of the course. During the second PDSA cycle, one of the pilot instructors required his students to create their tutoring account during the first week, hoping that this would lead to increased usage throughout the term. The students in his sections dutifully created their account during the first week, but few of them returned for additional services. The number of students who engaged the Academic Learning Center after the first week of the course was similar to the numbers who sought

tutoring during the first PDSA cycle. The increase in communication efforts did not appear to lead to greater usage of the service.

Figure 10

PDSA Cycle 2: Academic Learning Center Usage
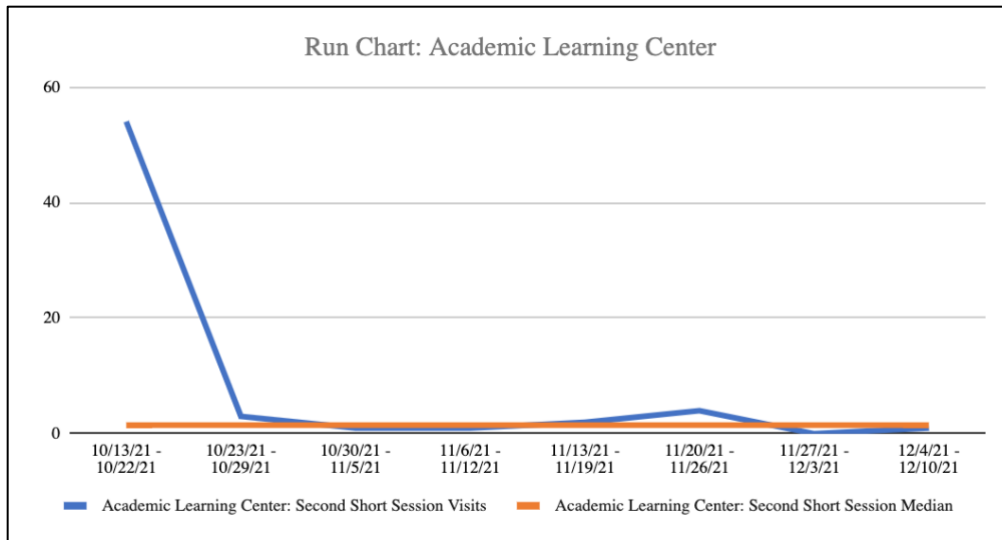
Unfortunately, we did not meet our threshold and had less than 35% of targeted students utilize tutoring services, and less than 25% of students accessed Single Stop services. After completing the first PDSA cycle and before the second PDSA cycle, we encouraged instructors to increase their incentive to use the support services and improve communication around the embedded supports. Additionally, we inquired about the possibility of holding one class on campus or having a synchronous virtual course so that the representatives from the Academic Learning Center and Single Stop could speak with the students and assist them in setting up their tutoring account and completing a benefits screener. Unfortunately, the faculty members could not require students to come to campus or participate in a synchronous virtual class. For the second PDSA cycle, however, the instructors agreed to improve their communication methods around the embedded supports by providing links to the supports, increasing announcements

through the learning management system, and sending out additional emails. Additionally, they

discussed increasing the amount of extra credit or requiring their students to set up a tutoring

account and complete a benefits screener. Unfortunately, they did not require their students to set

up a tutoring account and complete a benefits screener. In addition, the tutor from the Academic

Learning Center increased the volume of emails sent to students and strategically scheduled test

review workshops before each exam.

Balancing Measures

Balancing measures examine other parts of the system to ensure there are no unintended

consequences as a result of the improvement initiative (Bryk, et al., 2015). Conducting a

document analysis of sample syllabi from the course sections involved in the research helps to

evaluate whether or not the improvement initiative impacted the objectives for the course. An

analysis of a course syllabus from a section that received the embedded support and a course

syllabus from a section that did not receive the embedded support showed no change in course

objectives. Both syllabi included the course signature assignment and the same student learning

outcomes. This analysis demonstrated that the academic rigor and objectives of the pilot sections

were consistent regardless of the presence of embedded supports.

Summative Evaluation of Improvement Methodology

Outcome Measures

In improvement science, outcome measures help determine if an intervention led to a

change and if that change was an improvement. To know if the outcome measure resulted in an

improvement, a baseline must first be established. The results of the initiative can then be

compared to that baseline. For this initiative, we intended to compare students' success rates in

the targeted sections to students' success rates in these same compressed courses in a prior term.

Success rates are defined as the number of students achieving A, B, or C grades and the number

of students retained to the following term. We then intended to perform an independent sample *t*-test to determine if there was a difference between the two groups and if that difference was significant (Tanner, 2012). A significant difference would indicate that the intervention resulted in an improvement.

External Influences

During the spring 2021 term, the country was still experiencing the impacts of COVID-19. Although CPCC offered an increased number of hybrid course sections, classes that provide a combination of in-person and online instruction, the majority of learning continued in an online format with no in-person class meetings. In early February 2021, CPCC experienced a cyber intrusion that caused the cancellation of classes for two weeks (Thomas, 2021). When classes resumed, they were taught in a new learning management system, forcing faculty and students to adapt to a new learning environment in a short period of time. While this event impacted all spring 2021 classes, the effect was more pronounced on those offered in the compressed eight-week sessions, particularly those running during the earlier part of the semester. This unprecedented disruption brought about the confounding of all spring 2021 student outcome data.

Although we had initially intended to compare the outcomes of our fall 2021 research data to similar spring 2021 sections, the cyber intrusion and subsequent abrupt transition to a new learning management system confounded the student outcome data, making it unreliable as a baseline. We then considered the use of summer 2021 outcome data, as this was the next available term. Although many students enroll throughout the year, the summer term attracts a large number of visiting students. Visiting students are those whose primary campus is a four-year university, frequently out of town, but who have elected to complete one or more of their requirements at their local community college while home during their summer break. Because

many visiting students choose to take general education courses, such as MAT-171, during the summer, we determined that the student population and outcomes of the summer 2021 term would not be representative of the student population and outcomes found during the fall and spring terms. To establish the baseline necessary for our outcome measures, we used the outcomes from the MAT-171 sections offered in eight-week sessions during the fall 2020 term. This allowed us to compare a fall term to another fall term. Three eight-week compressed sections of MAT-171 were offered during the fall 2020 term. Two of these sections were hybrid, meaning the instruction was primarily online, and one section was offered completely online. Due to the COVID-19 precautions in place during the fall 2020 term, however, the hybrid sections only included a handful of in-person class meetings, making it feel more like an online course for the enrolled students.

Summative Evaluation Results and Response

The summative evaluation of our intervention allowed us to measure target outcomes to determine if intended goals were achieved. Specifically, with the summative assessment, we focused on quantitative outcome measures that would help determine if the intervention resulted in an improvement. With these measures, we examined course grades and retention rates for the term. Our goals for the intervention were as follows:

1. The number of students earning successful grades (A-C grades) in eight-week sections of MAT-171 will increase by 5% from the baseline sections to the sections with embedded support.

2. The number of students enrolled in eight-week sections of MAT-171 and then retained to the following term will increase by 5% from the baseline sections to the sections with embedded support.

The first goal was achieved through the first PDSA cycle of the intervention but was not maintained through the second cycle. The percentage of successful course grades (A, B, or C grades) increased from 53.33% during the baseline fall 2020 term to 62.07% during the first PDSA cycle. During the second PDSA cycle, 55.61% of students earned successful grades of A, B, or C. Although this is an increase from the baseline term, it did not meet the 5% benchmark goal and was lower than the success rates achieved through the first PDSA cycle. The first PDSA cycle was conducted during the first eight-week session of the fall 2021 term, which runs August through October. The second PDSA cycle was conducted during the second eight-week session, which runs October through December. Historically, success rates of students taking eight-week compressed courses during the first eight-week session are higher than the success rates for the second eight-week courses. From the 2016-2017 academic year to the 2019-2020 academic year, 82% of CPCC students across all disciplines earned successful grades during the first eight-week session, compared to only 74% of students who earned successful grades during the second eight-week session (CPCC, 2020c). The decrease in successful course grades between our first and second PDSA cycles is comparable to this institutional pattern and may be influenced by factors outside of the scope of this intervention. Additionally, the number of students enrolled in the target sections tripled from the first PDSA cycle to the second cycle; this drastic increase in the sample size may have also contributed to the change in outcomes.

The second benchmark goal was achieved through both PDSA cycles of the intervention. The percentage of students enrolled in an eight-week section of MAT-171 and then enrolled the following spring increased from 61.67% for the baseline fall 2020 term to 74.14% during the first PDSA cycle. The percentage of students retained to the following term further increased to 77.54% for the second PDSA cycle. As seen in Figure 11, each PDSA cycle resulted in substantial improvement in retention to the following term over the baseline term. From the fall

2012 term through the fall 2017 term, the fall-to-spring retention rate of all students at CPCC remained fairly consistent, ranging from a low of 70.0% in fall 2014 to a high of 71.6% in fall 2017 (CPCC, 2022). The retention rate of the students in the baseline section was substantially below the institutional retention rate; however, the retention rate of students in both PDSA cycles was higher than the institutional average. Although causation cannot be attributed to this research, the higher percentage of retained students is encouraging in terms of student progression.

Figure 11

Increase in Retention to the Following Term Compared to Baseline Term
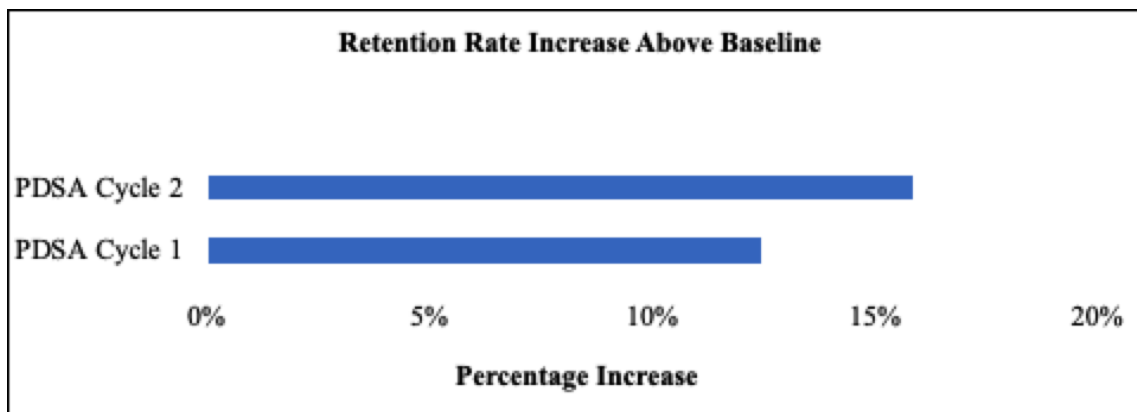
Overall Data Analysis

In order to compare the outcomes from the fall 2020 compressed eight-week sections that did not receive the treatment to the fall 2021 sections that did receive treatment, a series of independent sample t-tests were conducted to determine if the intervention resulted in a difference and if that difference was statistically significant. These tests compared the mean rate of successful course grades and retention rates of the baseline fall 2020 sections with the fall 2021 sections that received the embedded support. Grades of A, B, and C were classified as successful grades. Grades of D, F, and W were classified as unsuccessful grades. Students who

either graduated or enrolled in courses for the following spring term were considered to be retained to the next term. Students who neither graduated nor registered for the following spring were considered to not be retained to the next term. Some students may not have enrolled for the subsequent spring term because they transferred to another college or university. Transfer data for individual students was not available; while this is a slight limitation, it likely impacted both the baseline and implementation terms in a similar manner.

The first tests evaluated the outcomes from the first PDSA cycle sections with embedded supports to those from the baseline fall 2020 sections that used traditional learning methods and did not include any additional support. An independent sample t-test was conducted to compare the successful course grades in traditional learning and embedded support conditions using sections from the first PDSA cycle. There was not a significant difference in the course grades of sections that had embedded support (M=0.62, SD=0.49) and those that did not (M=0.53, SD=0.50); t(116)=-0.956, p=0.341. Although the percentage of students who received grades of A, B, or C was greater in the fall 2021 sections with embedded support (62.07%) than in the sections without embedded support (53.00%), this difference was not significant.

An independent sample t-test was then conducted to compare retention to the following term in traditional learning and embedded support conditions using sections from our first PDSA cycle. There was not a significant difference in the retention to the following term of students who did not receive support (M=1.38, SD=0.49) and students who received embedded support (M=1.26, SD=0.44); t(116)=1.450, p=0.150. Retention rates, however, did increase from 61.67% for the baseline fall 2020 term to 74.14% for the first PDSA cycle in 2021.

After reviewing the formative data from the first PDSA cycle, we incorporated changes to the intervention that we hoped would lead to an improvement in outcome measures. As a result, we conducted additional independent sample t-tests to determine if there was a difference

in course grades and retention to the following term using the second PDSA cycle data. The second PDSA cycle included a sample size of 187 students. Because this sample is considerably larger than the baseline sample size of 60 students, we feared that variances might be unequal and the *p* value might not be as reliable. In order to make the sample sizes equal, we used SPSS to randomly select 60 cases from the second PDSA data set to use for testing. We then compared this group to the data set from the baseline fall 2020 sections that utilized traditional learning methods with no additional support.

  The first test was to compare the number of successful course grades earned. An independent sample t-test was conducted to compare successful course grades in traditional learning and embedded support conditions using sections from the second PDSA cycle. There was not a significant difference in course grades of students who did not receive the support (M=0.53, SD=0.50) and students who received embedded support (M=0.58, SD=0.50); t(118)=-0.548, p=0.585. The percentage of students who earned grades of A, B, or C was greater in the sections with embedded support (55.61%) than in the sections with traditional learning (53.00%). As seen in Table 7, however, our analysis determined that the difference was not significant for either PDSA cycle.

Table 7

Results of Independent Sample T-Tests Comparing Successful Grades in Traditional Learning and Embedded Support Sections

PDSA Cycle	Traditional learning		Embedded Support		*t*	df	*p*
	M	*SD*	*M*	*SD*			
PDSA Cycle 1	0.62	0.49	0.53	0.956	0.956	116	0.341
PDSA Cycle 2	0.53	0.50	0.58	0.50	0.548	118	0.585

Note. Students who earned a successful grade were assigned a value of 1. Student who did not

earn a successful grade were assigned a value of 0.

An independent sample t-test was then conducted to compare retention to the following

term in traditional learning and embedded support conditions using sections from our second

PDSA cycle. This test used the randomly selected 60 cases from the second PDSA cycle data set.

As seen in Table 8, there was a significant difference in the retention to the following term of

students who did not receive support (M=1.38, SD=0.49) and students who received embedded

support (M=1.22, SD=0.42); t(118)=-1.483, p=0.047.

Table 8

Results of Independent Sample T-Tests Comparing Retention to the Subsequent Term in

Traditional Learning and Embedded Support Sections

PDSA Cycle	Traditional learning		Embedded Support		*t*	df	*p*
	M	*SD*	*M*	*SD*			
PDSA Cycle 1	1.38	0.49	1.26	0.44	1.450	116	0.150
PDSA Cycle 2	1.38	0.49	1.22	0.42	1.483	118	0.047

Note. Students who were retained to the following term were assigned a value of 1. Student who

were not retained to the following term were assigned a value of 2.

The theory of improvement for this intervention holds that "embedding proactive,

intentional, holistic supports that address under-resourced community college students' academic

and basic needs within eight-week courses will result in higher course success rates, leading to

improved retention and credential completion." Based on our findings, we have determined that

our intervention was successful despite not all analysis returning statistically significant results. The intervention did result in increased outcomes, most of which met our benchmark goals. In addition, qualitative data found that both faculty and students found value in the embedded support. For these reasons, we consider the intervention to be successful, but acknowledge that there are several areas of opportunity for future consideration. Although the academic and basic needs supports were embedded into the targeted sections, few students engaged with the support services beyond the minimum interaction that the instructors incentivized. As a result, we have several recommendations that we believe will lead to greater improvement.

Recommendations

Lessons for Implementation

We gained valuable insight and learned multiple lessons from the beginning to the end of our intervention. First and foremost, the design team and the faculty who worked with us to implement our intervention wholeheartedly believed in the intervention and provided us with valuable support throughout the process. They understood that if our intervention succeeded, students would succeed.

One of the lessons we learned from the intervention was the importance of organization. Compressed eight-week sessions move quickly for not only students and faculty, but also for the scholar practitioners studying them. We created a schedule for check-ins, debriefs, and focus groups at the start of each session, which was extremely helpful. CPCC had only a two-day fall break between the eight-week sessions during the implementation term. This did not leave much time for analyzing our first PDSA cycle and determining what revisions needed to be made for the second PDSA cycle; had the team meetings and focus groups not been scheduled in advance, it would have been difficult to conduct them within the allotted time.

A second lesson we learned was that we should have asked faculty to require the services at the beginning of the course and incentivized continued use. The faculty incentivized completing the benefits screener at Single Stop and creating an account with the Academic Learning Center. While many students did these initial steps, few continued to use the services throughout the term. Incentivizing further use, such as actually working with a tutor or attending a test prep workshop, may have prompted more students to take advantage of them. Students may have then personally seen the benefit of the service and continued on their own. Qualitative data from student interviews indicated that many supported requiring interactions with both the Single Stop Office and the Academic Learning Center, suggesting that students may realize that they need the additional prompt of a requirement to take full advantage of the benefits offered to them.

The COVID-19 pandemic shifted these compressed courses to an online modality, making it more difficult for the Academic Learning Center and Single Stop staff to build rapport with the students from the beginning of the course. We believe that the intervention would have led to greater improvement had we had the opportunity to implement it in a seated course or in a section with at least one face-to-face session with the students. Setting up the tutoring account can be somewhat complicated, and the benefits screener can be confusing. Having a representative in a lab assisting the students through the set-up processes assures that each student has set up an account or completed the screen correctly. Additionally, it allows the student to ask questions and gain more information on services.

Most importantly, however, the students who utilized the support and provided their feedback felt that it contributed to their success. They were grateful that the College offers these types of support services.

Lessons for Social Justice

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Community colleges have long provided opportunities for individuals from low socio-economic backgrounds but continuously struggle in their efforts to provide equal opportunities for their students. Our intervention was offered to all students who enrolled in the piloted courses, with the intended outcome being that under-resourced students would gain the most benefit by using the embedded support services. Research tells us that under-resourced students, specifically those receiving federal financial assistance, are majority female, have children, have a low median household income, and work full or part-time (Cho et al., 2013). Under-resourced students are beginning their education with one hand tied behind their back. Although we are providing them with the same opportunities as other students, due to their circumstances many of these students are starting at a disadvantage.

Our improvement initiative offered embedded support services in online sections of MAT-171. Representatives from the departments offering the support services provided videos and written information on how to access the services. However, we are fully aware that not all students excel in online courses for multiple reasons. Access to technology and the Internet is a constant struggle for many students, making it challenging to complete the course and leaving little room to determine how to register and use online support services. To even out the playing field, we must offer the support services and develop opportunities and procedures to utilize the services in various formats.

Limitations

Several limitations impacted the implementation and application of this intervention. The intervention took place during the COVID-19 pandemic; this caused us to alter how we implemented our intervention. Although we initially hoped to implement the intervention in seated, in-person classes, the COVID-19 pandemic forced the College to offer all eight-week compressed sections of MAT-171 as online course offerings to meet the needs of the students.

The online nature of the courses made it considerably difficult for the representatives of the Academic Learning Center and the Single Stop Office to build a connection with both the faculty teaching the courses and the students in the targeted sections. The targeted sections did not require students to meet synchronously, eliminating the opportunity for face-to-face interaction. Although videos and instructions were sent via email to the students in the targeted course sections, getting started in the process, setting up virtual tutoring accounts, and navigating the Single Stop platform can be tricky without the hands-on assistance of a representative from the department. In addition, the majority of tutoring services provided by the Academic Learning Center during the implementation term were virtual due to student preference and the need for social distancing. Although tutors employed a video conferencing platform to work with students, the virtual environment was a new way to deliver this assistance, and some participants encountered issues. A few of the problems encountered included maintaining a consistent Internet connection, operating the platform's features, and juggling other demands in their study space, such as children who were remote learning in the same space as the students. CPCC also experienced a cyber intrusion during the spring 2021 term that forced the College to pivot to a new learning management system in a very short amount of time. This learning management system was still new to faculty and students during the implementation of the intervention; learning to navigate comfortably within this system created an additional challenge.

Recommendations for Future Research and Practice

While this intervention was successful in achieving its benchmark goals, additional research is needed to further explore the relationship between embedded support and student success and to examine methods for improving academic success in compressed college-level math courses.

Embedded Support and Student Success

When planning for this intervention, we theorized that having the support services available and incentivized within the class would drive more students to take advantage of them. In reality, though, while the academic and non-academic supports were incorporated into the targeted sections, few students used them beyond the interactions incentivized by the faculty. Prior studies had demonstrated that few students take advantage of the support services offered at their institutions and that the students who might benefit the most from the services rarely use them (Karp et al., 2008, Scott-Clayton, 2011; Kalamkarian et al., 2021). Our intervention found that this is true even when the support services are embedded within the class. Future interventions would benefit from integrating the use of the supports as a requirement within the class, not just as an incentive for extra credit. This requirement for using support services should extend throughout the course and not only at the beginning.

During the implementation term for this intervention, CPCC also began a redesign of its student advising and support model. The new model, which is scheduled to be implemented sometime in 2022, uses a case management approach that provides each student with an assigned navigator and advisor. The navigator and advisor form a support team for the student and provide them with a connection to the college and its services. One goal of the redesign is to identify students' needs so that the institution can tailor supports for each individual student. As this model is implemented, there is the potential for assigned advisors to work with faculty, tutors, and Single Stop staff to ensure students are getting the support they need to be successful in their courses. Advisors can share information with instructors and embedded tutors to more quickly identify students who will need additional academic support. They can also continuously work with the Single Stop Office to address challenges with securing basic needs that their advisees may experience.

As part of the advising and student support redesign, the College also acquired technology that can help advisors and other staff proactively support students and potentially help the intervention scale. The new technology product includes several features designed to improve students' academic success. Work is currently underway to embed a survey into the system that would be completed as students enroll in the College. The survey will collect information about each student's finances, living situation, and support system. In conjunction with the system's predictive capabilities, advisors can then ascertain quickly which students may be at the highest risk of not persisting and proactively offer support. In addition, the system also includes an early alert system that can immediately notify a student's advisor when their grade drops below a specific threshold, they fail a test, or even after a certain number of class absences.

Compressed Courses

Additional research is also needed on compressed courses. Although existing literature has documented increased success rates in shorter courses, there are opportunities to examine academic achievement in compressed college-level math courses. While studies focusing on math exist, these primarily address student performance in developmental math (Durdella & Durdella, 2009; Floyd, 2017). Recent trends in developmental education reform now favor approaches that enroll developmental students in their college-level and developmental courses simultaneously, providing students with additional content support as they need it (Ran & Lin, 2019). At the same time, increasing numbers of community colleges are adopting compressed course structures, offering more courses that are six to eight weeks in length. Future research should focus on how to ensure that students who need the remediation of the developmental courses are equally likely to succeed in the compressed course. Given historically lower course success rates in math and the pivotal role completion of math plays in predicting student completion, ensuring success in math for all students is critical to increasing graduation rates.

Future Work on Campus

The findings of this disquisition, particularly the increase in academic performance and term-to-term retention, support continuing efforts to embed academic and non-academic services within compressed math courses. Although not all increases were significant, both students and faculty saw the embedded support as beneficial to success in the course. The findings of this disquisition will be shared with our stakeholders, the math faculty and their leadership, the Academic Learning Center staff, and the Single Stop staff. With their support, we hope to work with these areas to continue refining our model of embedded support in compressed math courses. Beginning with the second eight-week session of the spring 2022 term, the compressed MAT-171 courses will be offered in a hybrid format that includes an in-person component. Offering the course in this modality provides an opportunity to bring Academic Learning Center tutors and Single Stop staff into the classroom where they can begin to forge a connection with the students. Additionally, we plan to work with the Center for Teaching and Learning Excellence to develop workshops for faculty that focus on embedded student support services. We believe that our findings are a foundation for future strategies to improve outcomes for under-resourced students.

Conclusion

Under-resourced students face multiple barriers in completing their education. Community colleges must work to remove these barriers, not perpetuate them with a "cafeteria model" (Bailey et al., 2015, p. 13) of services. Alternative models, such as the ASAP and SAIL programs, that require intentional interactions with advising and other supports can help under-resourced students complete their degree and find a pathway to the middle class. The COVID-19 pandemic created even more challenges for those living in poverty and highlighted their

struggles nationally and internationally. Now more than ever community colleges must work intentionally to improve outcomes for this growing population of students.

In conducting this research, we explored the challenges that under-resourced students face while enrolled in college. Using the fishbone tool, we identified a number of factors that contribute to these challenges, ultimately focusing our intervention on the improvement of institutional structures. Using a driver diagram, we refined our work in three areas - compressed terms, academic support, and connection to basic needs support. We developed an intervention that incorporated these three areas and highlighted the major activities of the initiative on our timeline. We conducted two PDSA cycles of the intervention, using formative data to inform adjustments to our approach during the second cycle. Following the second cycle, we evaluated our results. Although not all of our findings were significant, we consider the intervention to be successful. Our quantitative data showed an increase in the percentage of successful course grades and an increase in the retention of students to the following term. These increases in successful grades and retention, while not all statistically significant, are improvements that benefitted real students and helped further them on their academic journey. Qualitative data suggested that faculty, staff, and students perceived the intervention to be making a positive impact on student success and retention. We know that this is simply the beginning and more work is needed. Improving the success of a student population is not an easy or quick process and sometimes it happens only a few students at a time. Continuous and intentional focus on increasing student outcomes is crucial to ensuring equitable academic and economic opportunities for all groups.

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Appendix A

Faculty and Staff Interview Questions

Faculty (F)
Staff (S)
Faculty and Staff (F & S)

We would like to hear your perspective on non-academic challenges students face.

1. (F & S) What is your role and how long have you been working at Central Piedmont?

2. (F) How did you embed the Academic Learning Center and Single Stop into your course?

3. (F) How often did you discuss the two student support services and/or remind your

   students to use them?

4. (F) Did you offer any incentives for students to utilize one of the two services?

5. (F) Did any of your students choose not to use one or either support services? Do you

   know why or why not?

6. (S) From your experience, did students seek out support services at the beginning,

   middle, or end of the course?

7. (F & S) What type of help did you find that most students in this course needed?

   1. Did you have the resources you needed to meet the need?

   2. What format did you use to meet this need (i.e., virtual, in-person, phone, etc.)

   3. On average, how much time did you spend with each student?

8. (F & S) Do you feel that the students who utilized the supports were more successful in

   their courses than they might have otherwise been [or than were other students who did

   not use the supports]? Why or why not?

9. Do you feel that the students in this compressed course with embedded support services were more successful than students who were in one of your previous 16-week courses? Why or why not?

10. (F & S) Is there anything else you would like to share?

Appendix B

Student Interview Recruitment Email and Brightspace Announcement

Dear Student:

You are invited to participate in a virtual interview discussion of your experiences in the math

class you are enrolled in at Central Piedmont Community College. The interview will be held on

(insert date, time, and location) and should last no longer than one hour.

The interview will provide an opportunity for you to share your experiences in (insert title of

math course). In particular, we would like to know about support services you may or may not

have used during the term and how you feel they influenced your level of success. Your views

will be used to help build stronger support systems for future math sections.

If you do not feel comfortable discussing your use of the support services and how they may or

may not have influenced your success in the course you do not have to participate in an

interview. The interview is completely voluntary and there are no repercussions for not

participating.

If you would like to take part in an interview, you must be at 18 years of age or older. Please let

us know if you would like to participate by contacting Dena Shonts at dena.shonts@cpcc.edu.

More information will be sent to those confirming attendance before the focus group.

Thank you,

Dena Shonts and Amy Bruining

Appendix C

Faculty and Staff Interview Recruitment Email

Dear Colleagues:

You are invited to participate in an interview to provide your experiences teaching and supporting math class at Central Piedmont Community College that are piloting embedded student support services. The interview will be held on (insert date, time, and location) and should last no longer than one hour.

The interview will provide an opportunity for you to share your experiences in this pilot. In particular, we would like to gain insight on the impact, use, and frequency that the support services had on student success and completion. Your views will be used to help build stronger support systems for future math sections.

Participation in the interview is completely optional and there will not be any repercussions if you choose to not participate.

Please let us know if you would like to participate by contacting Dena Shonts at dena.shonts@cpcc.edu. More information will be sent to those confirming attendance before the interview.

Thank you,

Dena Shonts and Amy Bruining

Appendix D

Student Interview Questions

We would like to hear your thoughts about the support services your instructor discussed with you at the start of this course.

Let's start by discussing Single Stop.

1. At the beginning of the course, your instructor informed you of a support service the College offers called Single Stop.

    1. Did you complete a screener or contact the Single Stop Office at the beginning of the course? The middle? Towards the end?

    2. If you did not complete the screener or visit the Single Stop office, would you mind telling us why?

    3. If you did use Single Stop services how many times did you interact with Single Stop?

    4. How many services did you receive from Single Stop?

    5. How was your experience using Single Stop?

    6. Do you feel like the support services you received from Single Stop enabled you to be more successful in your course versus previous courses you took at the College? Why or why not?

Thank you for that feedback. Now we would like to discuss the Academic Learning Center

2. At the beginning of the course, your instructor informed you of academic support services through the Academic Learning Center.

    1. Did you visit the Academic Learning Center at the beginning of the course (virtually or in person)? The middle? Towards the end?

2. If you did not visit the Academic Learning Center, would you mind telling us why?

3. How many times and for how long did you utilize the Academic Learning Center?

4. How was your experience with the Academic Learning Center?

5. Do you feel like the support you received from the Academic Learning Center enabled you to be more successful in this course versus previous courses you took at the College? Why or why not?

6. Do you think that support services like the Academic Learning Center and Single Stop should be embedded and introduced at the beginning of all courses?

3. Is there anything else that you would like to tell us?

Appendix E

Single Stop Screener

Single Stop™   🏠 **CENTRAL PIEDMONT** COMMUNITY COLLEGE

Hi dena.shonts@cpcc.edu | Sign Out

English ⌄

My Dashboard   My Profile   Local Resources

In an abundance of caution, we understand that some sites may be closed or working in a reduced capacity due to the Covid-19 outbreak. We urge you to contact a site before visiting or scheduling an appointment. If you are screening yourself for benefits please note we are able to provide benefits results in NY, NJ, PA, NH, DC, VA, NC, FL, LA & MS.

Step 1	**Step 2**	**Step 3**	**Step 4**
About You	Your Household	Household Finances	Review

Jump To: (Basics) (Race and Ethnicity) (Special Cases)

Household

All fields are required

Is there anyone in your household besides you?
A household:
 • Is generally your family members.
 • Includes people you support OR who you depend on financially.
 • Does **not** include roommates unless they share all expenses.

🔘 Yes

⭕ No

👤 Household Member

What is their relationship to you?

Select relationship   ⌄

So far, you may be eligible for as much as

$2,396 per year in assistance!

You may be eligible:

🍎 **FOOD**

FNS
$179/month in aid
More info ⌄

WIC
Not Eligible
More info ⌄

💲 **TAX REFUNDS**

EITC
$248/year in federal aid
More info ⌄

Child Tax Credit

3/31/2021   Central Piedmont Community College - Household Finances

Single Stop™   CENTRAL PIEDMONT
                 COMMUNITY COLLEGE

                                                                   English ∨

                                    Hi dena.shonts@cpcc.edu | Sign Out

My Dashboard   My Profile   Local Resources

In an abundance of caution, we understand that some sites may be closed or working in a
reduced capacity due to the Covid-19 outbreak. We urge you to contact a site before visiting or
scheduling an appointment. If you are screening yourself for benefits please note we are able
to provide benefits results in NY, NJ, PA, NH, DC, VA, NC, FL, LA & MS.

| Step 1 | Step 2 | Step 3 | Step 4 |
| About You | Your Household | Household Finances | Review |

So far, you may be
eligible for as much as

$2,396 per year in
assistance!

Household Finances

Household Financial Support

Is there someone who supports you financially?
Mark yes if someone pays more than half of your expenses. This would be
someone who claims you as a dependent on their taxes.

◉ Yes

○ No

You may be eligible:

 FOOD

FNS
$179/month in aid
More info ∨

WIC
Not Eligible
More info ∨

$ TAX
REFUNDS

EITC
$248/year in
federal aid
More info ∨

Child Tax
Credit

Household Financial Supporter

What is their relationship to you?

| Select relationship   ∨ |

First name

Single Stop™   **CENTRAL PIEDMONT** COMMUNITY COLLEGE

English ⌄

Hi dena.shonts@cpcc.edu | Sign Out

My Dashboard   My Profile   Local Resources

In an abundance of caution, we understand that some sites may be closed or working in a reduced capacity due to the Covid-19 outbreak. We urge you to contact a site before visiting or scheduling an appointment. If you are screening yourself for benefits please note we are able to provide benefits results in NY, NJ, PA, NH, DC, VA, NC, FL, LA & MS.

Step 1	Step 2	Step 3	Step 4
About You	Your Household	Household Finances	Review

So far, you may be eligible for as much as

$2,396 per year in assistance!

Review

You

de		Edit

$ Household Financial Supporter		Change
First name	de	
Last name	sh	
Email	dena.shonts@cpcc.edu	
Phone	704-330-4806	
City	CHARLOTTE	
State	NC	
Zip code	28205	

You may be eligible:

🍎 **FOOD**

FNS
$179/month in aid
More info ⌄

WIC
Not Eligible
More info ⌄

$ **TAX REFUNDS**

EITC
$248/year in federal aid
More info ⌄

Child Tax Credit

Rent	$600
Pays utilities?	Yes
Student ID	777555
Date of birth	11/28/1973
Race	White
Ethnicity	Non Hispanic
Gender	Female
Attends college or takes classes?	Yes
Degree Pursued	Doctorate degree
Employment Status	Full Time
Blind/disabled?	No
Health Insurance	No
Pays child support?	No
Monthly earned income	$1,000
Level of Education	Master's degree
Student status	Half-time
Work study?	No
Works more than 20 hours a week?	Yes
Pregnant?	No
Supports	
Pays child care?	No

$0/year in federal aid
More info ⌄

HEALTH
Comprehensive Coverage - You
Not eligible
Supplemental Coverage - You
Free Medicaid Family Planning
More info ⌄

More resources to explore:

$ MONEY
More info ⌄

HOUSING
More info ⌄

WORK
More info ⌄

EDUCATION
More info ⌄

LEGAL
More info ⌄

IMMIGRATION
More info ⌄

Military service	No
Citizenship	A citizen/national of the United States
Other income?	No

« Back   Looks good

Exit and clear data

Single Stop
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