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Postsecondary Course-Taking and Academic Performance of Transitional Math Completers: A Quantitative Study of Students in Illinois

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ABSTRACT

POSTSECONDARY COURSE TAKING AND ACADEMIC PERFORMANCE OF TRANSITIONAL MATH COMPLETERS: A QUANTITATIVE STUDY OF STUDENTS IN ILLINOIS

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Northern Illinois University, 2023
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This quantitative study investigated the academic outcomes of high school students from one community college district in Illinois who took a high school transitional math course designed to give them direct placement into a college-level math course. The goal of successful completion of a transitional math course is to allow students direct placement into college-level math courses. This study provides a correlational analysis of specific academic success metrics between students who took transitional math and those who did not at one Illinois community college. The sample for this study included 100 students who completed a transitional math course and 525 students who completed a developmental math course. The academic success metrics investigated include college-level math course enrollment, passing or failing the first college-level math course, first-semester GPA, and first-semester to second-semester retention.

The results of this study indicate that transitional math completers are more likely to pass their first college math course than developmental math completers. At the same time, they are less likely to be retained from the first to the second semester of college. Results also show that transitional math completers take longer to complete a college-level math course, and grade point averages between the two groups were not statistically different. This study confirms that the academic momentum theory of taking courses early in the academic sequence has positively influenced academic outcomes.
NORTHERN ILLINOIS UNIVERSITY
DEKALB, ILLINOIS

MAY 2023

POSTSECONDARY COURSE TAKING AND ACADEMIC PERFORMANCE OF
TRANSITIONAL MATH COMPLETEERS: A QUANTITATIVE STUDY
OF STUDENTS IN ILLINOIS

BY
GINA CARONNA

A DISSERTATION SUBMITTED TO THE GRADUATE SCHOOL
IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE
DOCTOR OF EDUCATION

DEPARTMENT OF COUNSELING AND HIGHER EDUCATION

Doctoral Director:
Xiaodan Hu
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Eternal gratitude goes out to my family. To Mike, the man who became my husband in the middle of this journey and daily let me know I could do this. To my wonderful friend Joan, who bore the brunt of seeing me through this daily. To Henry, who came through for me when I needed it most. To Julia, who never failed to believe in me and encouraged me no matter what. To Ben, who cheered me on from 2000 miles away. To Genevieve, who edited that first paper of this journey for me and who, by the grace of God, is here to see the last paper.
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CHAPTER ONE
RESEARCH PROPOSAL

Across the United States, thousands of students enroll in community colleges every year in hopes of pursuing an education that will lead to a better job. However, many are met with a surprise requirement: over 50% cannot take college-level courses because they are required to first take remedial or developmental education (Adelman, 2006; Barnett, 2018; Chen, 2016). Surprisingly, of all of the community college students required to take developmental education, a mere 10% complete a degree or certificate (Bailey et al., 2010). This low completion reality is prompting governments across the United States to enact legislation crafted to give more people access to higher education (Adamy & Overberg, 2018). While state governments have oversight of publicly funded higher education institutions, admissions practices and other academic functions have typically been the purview of the institutions (Adelman, 2006). Since 1995, however, over half of the states have enacted legislation that directly impacts developmental education practices (Education Commission of the States, 2019).

Historically, students who are perceived to be academically unprepared to take college courses get placed into developmental education courses prior to being allowed to take college-level coursework (Bailey et al., 2010). Many of the developmental courses are in the core areas of math and English, both of which almost all college students must take to graduate. Perceptions of what it means to be unprepared can vary widely across colleges, but the majority of colleges in the United States use standardized tests with relatively arbitrary cutoff scores to place students into either college or developmental coursework (Hodara et al., 2012). Recent research shows,
however, that other measures are more predictive of college success, such as students' performance in high school (Woods et al., 2018). This research is causing placement practices to be challenged.

In addition to arbitrary placement practices, requiring developmental education poses several other fundamental problems. There are significant financial costs; estimates put the lack of student preparedness for college at $7 billion per year, while another $2.3 billion is lost due to students dropping out of developmental courses and the subsequent loss of earning potential (Scott-Clayton et al., 2014). Additionally, students of color and low-income students are placed into developmental education courses at a rate of 71% compared to their White counterparts at 42% (Bailey et al., 2010). Finally, developmental courses extend the time it takes for students to graduate, adding to reduced completion rates. Research on the attempts to reform developmental education is growing. Reforms tend to cluster in three areas: making developmental education optional, accelerated or corequisite developmental courses, and reform in placement practices.

In Florida, S.B. 1720 makes taking developmental education optional. Limited research initially shows positive results depending on what course is taken and the level of unpreparedness of students (Park et al., 2018). Many states, including Tennessee, Indiana, West Virginia, Georgia, and Colorado, have crafted legislation that requires developmental education to be offered simultaneously with college-level coursework. Research has shown that students participating in this solution, called corequisite education, pass at relatively the same rate as students not taking the support course (Logue et al., 2019). Reform in placement practices varies and includes using more than one method to place students into course levels, something known as multiple measures placement, implemented by 26 states (Education Commission of the States,
2021). Research has shown that multiple measures improve assessment and placement practices (Scott-Clayton et al., 2014). The final category involves shortening the time students are required to be in developmental courses before they can take college-level courses. This category has very little current research. Some states, like Kentucky, have legislated time limits of one semester or one course (Education Commission of the States, 2021).

Other states, including Illinois, have turned to courses that can be taught at the high school level and count as placement into college-level coursework. Transitional math courses are designed to increase college readiness for high school seniors. Successful completion of transitional math courses guarantees placement in a college-level math course at all Illinois community colleges. All high schools in Illinois are required to offer at least one transitional math course. To date, no research has been published on the impact of transitional math in Illinois. This research work will focus on legislated developmental education reform in Illinois, called the PWR Act, by analyzing academic outcomes at one Illinois community college.

**Purpose Statement**

In Illinois, 60% of community college students are required to take developmental math education as a prerequisite to taking college-level courses. Postsecondary success outcomes of retention and completion for the group of students taking developmental education are under 20% (Advance Illinois, 2016). The state of Illinois has crafted legislation (PWR Act) to address this problem. In 2009, the Illinois P-20 Council was formed to address escalating educational alignment in Illinois and increase the number of individuals with a certificate or diploma in Illinois. Through the efforts of the P-20 Council, House Bill 5729 (HB5729), also known as the Postsecondary Workforce Readiness Act (PWR), was created, passed unanimously, and signed
into law on July 29, 2016 (Advance Illinois, 2016). PWR has four essential components that deal with college and career readiness. The first is college and career pathways endorsements, which provide a structure for graduating high school students to receive a career endorsement on their diploma upon completing designated course sequences. The second is a postsecondary and career expectations framework, which outlines milestones for readiness from kindergarten to 12th grade. The third is competency-based education, which suggests a framework that allows K-12 districts to pilot suspension of seat time requirements for advancement between grade levels and subject matter areas. The fourth is transitional math, developmental math courses that are taught as high school courses (Illinois State Board of Education [ISBE], 2017).

The purpose of this study is to understand the postsecondary behaviors of high school students from one community college district who took a high school transitional math course designed to give them direct placement into a college-level math course. Given that the goal of transitional math is to allow students direct placement into a college-level math course, students who participated in transitional math are expected to enroll in college and successfully complete a college-level math course within 18 months of matriculation (ISBE & ICCB, 2019). Thus, this study will provide a descriptive analysis of specific academic success metrics between students who took transitional math and students who did not take transitional math at one Illinois community college. In the context of this study, these academic success metrics include college course-taking patterns, math course enrollment, and college retention. This study is guided by the following research questions:

1. What is the demographic profile of students who complete a transitional math program?
2. To what extent is students’ successful completion of a transitional math course related to their timing of taking the first college-level math course?

3. To what extent is students’ successful completion of a transitional math course related to their probability of passing the first college-level math course?

4. To what extent is students’ successful completion of a transitional math course related to their second-semester retention?

5. To what extent is the students’ cumulative GPA after the first semester related to the successful completion of a transitional math course?

**Review of Literature**

There are two bodies of literature and a political context in Illinois that inform this research. First, a review will be done of the literature regarding developmental education that is taught in college. Second, literature about academic success of students who take alternative developmental coursework, such as transitional high school courses, will be analyzed. Lastly, the political context in the state of Illinois regarding developmental educational reform legislation will be detailed.

**Developmental Education and Students’ Academic Success**

The perception that some students arrive at college underprepared to succeed in college courses has existed for decades. Traditionally, colleges and universities have addressed this issue by requiring academically unprepared students to take non-college-credit courses called remedial or developmental courses (Bailey et al., 2010). The National Center for Education Statistics (NCES) defines postsecondary developmental education as “courses in reading, writing, or mathematics for college-level students lacking those skills necessary to perform college-level
work at the level required by the institution” (Lewis et al., 1995, p. 1). Although the working definition of developmental education is generally agreed upon, efforts to address students deemed in need of remediation vary widely from one institution to the next (Attwell et al., 2012). Furthermore, there is not a recognized standard measure to gauge the need for an individual to be required to take developmental education. Instead, colleges and universities individually define the level of readiness for their institution's coursework, usually by a score on a standardized or placement test (Perin, 2006). Regardless of the measure, approximately 59% of students in community colleges and 33% of students at four-year institutions must take some type of developmental education (Chen, 2016). In addition, research shows that other students take assessments and tests as required for remediation but choose not to do so, prohibiting them from taking college-level coursework (Bailey et al., 2010). By any measure, there is a significant percentage of college students taking developmental coursework.

Because the percentage of students required to take developmental coursework is so high, the effectiveness of developmental education bears discussion. By definition, developmental courses exist to prepare students to be successful in subsequent college courses. Research increasingly shows, however, that students who take developmental education are 74% more likely than non-developmental education students to drop out of college (Barry & Dannenberg, 2016). Only 20% of students taking developmental coursework complete the next-level college coursework within two years of taking the class (Complete College America, 2016). Additionally, fewer than 1 in 10 developmental students complete a bachelor’s degree (Schak et al., 2017). Finally, over 50% of students who take a developmental education sequence fail to complete the sequence and thus never make it into college-level coursework (Bailey et al., 2010).
Thus, developmental coursework presents several problematic issues regarding access to college-level coursework.

The low percentage of college completion among developmental students has also been studied in regard to the cost to society. In Florida alone, the cost of developmental education was estimated to be over $81 million in 2009-2010 (Nix et al., 2019). Critics also cite that taxpayers are double charged by subsidizing the cost of teaching the same thing at the high school and community college levels (Boylan, 1999). Although not offered for college credit, developmental education is routinely billed out at the same rate as college coursework (Carnevale & Rose, 2015). This practice comes at a high cost to students who sometimes have to spend thousands of dollars on remediation before ever taking a college class, sapping resources and motivation while also limiting options to take college classes, that would lead to more sustainable wage careers (Attwell et al., 2012).

Many states have begun to implement legislation that requires high schools and colleges to partner to address the problem of students not completing college due to required developmental education. A 2017 survey showed that 39 states offered some form of transitional curriculum (Fay et al., 2017). Design options for courses center on two main areas, either courses that will place students directly into college math after successful completion or courses that are designed to be prerequisites to college-level math (Barnett, 2018). Preliminary results show that coursework that is designed by both the college and high school faculty together shows more success for student placement into college math (Barnett et al., 2018).
Developmental Courses Taught as Transitional Courses in High School

Given the breadth of evidence that developmental education is not successful for a high percentage of students, many states and colleges have developed coursework that students can take prior to graduation from high school that replaces developmental coursework (Barnett, 2018). These courses, typically called transitional courses, are designed for high school seniors to take in place of developmental college courses (Barnett et al., 2013). Over half of the states in the U.S have some type of transitional course for high school students (Fay et al., 2017).

Research shows that high school courses with a high level of correlation to college-level coursework, like advanced-placement courses, are also correlated with academic success in college (Woods et al., 2018). Further, students who took dual-credit courses in Indiana were less likely to need developmental coursework and had academic success early on in college (Stephan et al., 2015). Thus, demonstrated success with advanced placement and dual-credit courses might be leading to many states legislating high school transitional courses.

Additional reasons for developing transitional coursework may also include the potential misalignment between high school and college coursework content and has long been a concern for researchers (Kirst & Venezia, 2001; National Center for Public Policy and Higher Education, 2010). Misalignment can occur for multiple reasons, one of which is conflict between standards and course learning objectives (Hoffman et al., 2007). Another reason transitional coursework may be more successful in ensuring that students are prepared for college coursework is the potential for flawed course placement measures. For example, a common way to place students into college-level coursework is through standardized testing (Barnett et al., 2013). However, critics of standardized testing and other college readiness benchmarks are quick to point to the
fact that often standardized testing does not address what is being taught in the high schools, but rather what will be taught in college (Hoffman et al., 2007).

Transitional coursework is being offered in over 29 states and in a wide variety of formats (Barnett et al., 2013). The popularity of transitional coursework is apparent for several reasons, at least two of which are supported by research. First, completing remediation in high school saves students time and money, which are both predictors of college completion (Edgecombe, 2011). Secondly, transitional coursework is an accelerated form of education, allowing students to complete remediation in a shorter time frame. Completing accelerated remediation has been shown to increase enrollment and completion of gateway college courses (Jaggers et al., 2014). Although many states are implementing transitional coursework, research is limited and mixed results have been found regarding effectiveness.

West Virginia enacted transition coursework legislation requiring statewide implementation of transitional math by 2012. However, a 2016 study showed that the intervention did not improve the academic outcomes for the students who took the course (Pheatt et al., 2016). City University of New York developed a program called At Home in College, which offers high school transitional math courses and wrap-around counseling and academic supports. Students were shown to have a slightly higher percentage of passing their first college math course if taken within one year of the transitional coursework (Trimble et al., 2017). Tennessee implemented the Seamless Alignment and Integrated Learning Support (SAILS) program in 2013-2014, allowing high school students to take a developmental math course online in their senior year. Passing the high school course guarantees enrollment in a college-level course. Students who participate in SAILS are 29% more likely to enroll in a college course
and complete 1.5 times more college courses than their counterparts (Kane et al., 2018). Illinois enacted the Post secondary and Workforce Readiness Act (PWR) in 2018, which includes policy on transitional coursework similar to Tennessee.

**Illinois Solution for College Readiness**

Students at Illinois community colleges fare no better than students in other states when participating in developmental education. Forty-six percent of students need developmental coursework once they enter college (ISBE, 2017). Eighty percent of students who enroll in developmental education in Illinois do not earn a college degree, and developmental college courses cost over 36 million dollars per year (Advance Illinois, 2016). State agencies settled on transitional math as a solution to the high rates of remediation, citing the cost and time savings for students and research outlining the low rates of completion for students needing remediation (ISBE, 2017).

In 2009, Illinois legislated the formation of the Illinois P-20 Council, a statewide partnership between public educational institutions, workforce representatives, and social service organizations (Illinois P-20 Council, 2021). The P-20 Council mission is to deliberate and make recommendations to the Governor, Illinois General Assembly, and state agencies for developing a seamless and sustainable statewide system of quality education and support, from birth through adulthood, to maximize students' educational attainment, opportunities for success in the workforce, and contributions to their local communities (Illinois P-20 Council, 2021, About Us section).

A goal is to increase the number of Illinois adults who have a postsecondary degree or credential from 51% to 60% in 2025 (Illinois 60 By 25 Network, 2020). Through the efforts of the P-20 Council, House Bill 5729 (HB5729), also known as the Postsecondary Workforce Readiness Act (PWR), was created, passed unanimously, and signed into law on July 29, 2016 (Advance
Illinois, 2016). PWR has four essential components that deal with college and career readiness, one of which is the implementation of transitional math and English courses in all Illinois high schools (ISBE, 2017).

One of the Illinois PWR Act hallmarks is the emphasis on collaboration between the ISBE and the Illinois Community College Board (ICCB) to deliver transitional math and English coursework. The legislation outlines that K-12 districts must partner with the community college in their region to develop a high school transitional course that will replace any developmental education courses or sequences, allowing students who successfully pass the course to place directly into college-level coursework (PWR Act, 2016). Additionally, the courses developed are submitted to a portability panel for approval, allowing the courses to be accepted at all community colleges (ISBE & ICCB, 2019). ISBE in conjunction with ICCB created a comprehensive implementation plan that includes funding, professional development, implementation timelines for transitional math courses to be operational at all K-12 districts in Illinois (ISBE & ICCB, 2019).

Students in Illinois can opt to take transitional math in the second semester of their senior year. They are deemed eligible to take transitional math based on a comprehensive rubric that includes completion of state requirements for graduate math courses, grade point average, and standardized placement test scores (ISBE et al., 2018). The development of three math pathways addresses the alignment between secondary and postsecondary course outcomes. The first is algebra based and leads into placement in college algebra; a second is quantitative literacy-based and leads into college statistics; and the third is based in technical math, which leads to college technical math required for many career and technical education (CTE) pathways (ISBE et al.,
State-developed guidelines include comprehensive details for placement, course content, teacher qualifications, and portability of courses (ISBE et al., 2018).

**Theoretical Framework**

This study is influenced by the academic momentum theory. Academic momentum is defined as the speed at which a student persists to complete a bachelor's degree (Adelman, 2006). The theory of academic momentum gained popularity after a longitudinal study by Clifford Adelman was published in 2006. In this study, a nationally representative sample of traditional-age students entering two-and four-year colleges was used to determine what variables could be related to the likelihood that students would complete bachelor's degrees (Adelman, 2006). Subsequently, further research focused on longitudinal student academic progression and degree completion has been conducted (Attewell et al., 2012). Three guiding tenets are critical to academic momentum theory. First, the initial course load that a student takes, combined with the progression from first semester to the second semester, defines the subsequent path of trajectory to degree completion. Secondly, academic momentum is a strong predictor of degree completion, even after the factors of socioeconomic characteristics and pre-college achievements are taken into account. The third tenant is student patterns of enrollment (e.g., continuous enrollment versus stopping out) and specific academic activities (e.g., taking summer courses) that influence academic momentum (Attewell et al., 2012). Thus, academic momentum theory focuses on speed of progression and continuity of enrollment as they relate to degree completion.

Academic momentum theory is built on the human capital investment model (Adelman, 2006). Using this perspective, when students make enrollment decisions such as how many courses to take, they are choosing how to invest their time and money in completing college.
When students make investment choices that accelerate their progression to complete a degree, they are more likely to actually complete it. Conversely, when students make choices to invest less and decelerate their time to completion, they are less likely to complete (Adelman, 2006). Further, Adleman found that once a student has accumulated one year’s worth of college credits in a 12-month time frame, the factor of a student’s demographic profile becomes a modest predictor of degree completion (Adelman, 1999). This finding has significant ramifications for how interventions designed to impact academic momentum are implemented.

Specific academic activities are also a part of the academic momentum theory. For example, activities such as taking summer classes have a positive influence on momentum, whereas activities like taking time away from college slow momentum (Adelman, 1999). Dual-enrollment activities, where high school students take courses that count towards both high school and college completion, also have a positive influence on academic momentum. This appears to be especially true when students move uninterrupted from high school to college (Wang et al., 2015). Essentially, Adelman concludes that student choices that accelerate progression help them earn a diploma. Student choices that slow down progression results in a greater chance that they will not complete earning a degree.

For several reasons, academic momentum theory can help explain the impact that successful completion of a transitional math course has on college course taking, semester-to-semester retention, and passing college math for. First, transitional math can be categorized as a dual-enrollment class because it mimics college remedial math classes. Dual-enrollment has a positive influence on momentum. Secondly, opening the black box and examining the impact that successful completion of an individual’s courses may have on completion can assist in a
better understanding of what motivates student persistence to a degree. Finally, examining the
effect that taking a transitional math course has as a steppingstone for the attainment of other
academic milestones can be useful in determining if transitional math in effect jumpstarts
academic momentum.

**Method**

This quantitative study aimed to examine the relationship between students’ participation
in a high school transitional math course designed to give students direct placement into a
college-level math course and their postsecondary academic outcomes. This study used
descriptive analysis to address the research questions. Descriptive analysis is useful to analyze
data at the implementation stages of an initiative like PWR transitional math because it can
provide practitioners and policymakers with relevant information (Creswell, 2015). Descriptive
analysis can assist in the identification of patterns in data that have not been previously
recognized (Loeb et al., 2017). Finally, using descriptive analysis research to assist in
establishing a correlational relationship for intervention can be very useful (Loeb et al., 2017).
This study can assist in determining a correlational relationship between the intervention of
transitional math and student postsecondary academic success.

**Data Source and Sample**

This study used secondary data generated by Mid West College’s (MWC; a pseudonym)
information systems and software databases. When studying the effects of an established
intervention, it is appropriate to utilize secondary data (Creswell, 2015). Data is provided without
any personal identifiers. Data collection from only one source helps ensure that the same
measurements were utilized to determine the data. The secondary data used for this study was
already validated and initially collected to admit, enroll, and evaluate various academic measures of students. Data from the MWC Office of Institutional Research is standardized according to the Illinois Community College Board (ICCB) and the Integrated Postsecondary Education Data System (IPEDS) at the National Center for Education Statistics. IPEDS standardized data collection methodology is followed (IPEDS, 2018). Student data collected from the MWC Office of Institutional Effectiveness included demographic data, grades earned in transitional math classes, courses taken in the first two semesters at MWC, and first-semester to second-semester retention data. All data was cleaned of any personally identifying information and stored on a safe, and password-protected drive.

MWC (a pseudonym) is a two-year community college located in Rockford, Illinois. MWC serves over 4,500 students each year and offers courses in transfer, career, and certificate-based programs. The sample for this study includes all MWC students who were not considered college ready in their 12th grade. Among these students, the treatment group includes students residing in MWC District XXX who took transitional math courses in their 12th grade in the 2019-2020 (n = 160) and the 2020-2021 school years (n = 105), respectively. The control group consists of students who attended MWC and took developmental math after high school graduation in the 2019-2021 school years (n = 700).

**Variables**

As indicated in Table 1.1, the outcome variables for this study include a) first-semester to second-semester retention, b) the semester in which college math is taken, c) passing a first college math course, and d) cumulative GPA after one semester. These outcome variables are significant because the goal for students who are taking transitional math is to remove the barrier
of entry into college-level math course enrollment and increase student retention and academic success (ISBE, 2017). The first-semester to second-semester retention was measured as a binary variable. If a student stayed enrolled in the second semester, it was coded as 1 and 0 otherwise. The variable of which semester a math course is taken was measured as a continuous variable, representing the number of semesters a student enrolled at MWC since high school graduation. The grade for the first college math course is coded as 0 for failing and 1 for passing with a D or better letter grade. The variable of cumulative GPA after one semester is a continuous variable and will be coded as reported to the nearest tenth of a percent.

The predictor variable for this study is the intervention of a transitional math course. Students who took and successfully completed a transitional math course in MWC District XXX in the two-year time frame identified were studied. Eligibility to take a transitional math course is determined by the criterion outlined in Appendix A.

The control variables for this study are the demographic characteristics of the students. Based on variables that have been found to have a relationship with college academic outcomes in previous research, the variables included student gender, declared race, age at college entrance, and student household income status (Barnett et al., 2018; Pheatt et al., 2016; Trimble et al., 2017; Woods et al., 2018). Demographic characteristics were collected in the student application to MWC. Household income status will be determined by student eligibility for a Pell Grant.
Table 1.1. Description of Variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Outcome Variable</strong></td>
<td></td>
</tr>
<tr>
<td>First semester to second semester retention</td>
<td>0 = No; 1 = Yes</td>
</tr>
<tr>
<td>Semester in which college math is taken</td>
<td>1 = first; 2 = second; 3 = third; 4 = fourth</td>
</tr>
<tr>
<td>Grade in first college math course</td>
<td>0 = fail; 1 = pass</td>
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<tr>
<td>Cumulative GPA after 1 college semesters</td>
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<tr>
<td><strong>Treatment Variable</strong></td>
<td>Whether completed transitional math course in high school</td>
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<tr>
<td><strong>Demographic Variable</strong></td>
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<tr>
<td>Sex</td>
<td>0 = Male; 1 = Female</td>
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<tr>
<td>Race/Ethnicity</td>
<td>1 = White; 2 = African American/Black; 3 = Hispanic/Latino; 4 = Asian or Pacific Islander; 5 = Other</td>
</tr>
<tr>
<td>Age at college entrance</td>
<td>Continuous</td>
</tr>
<tr>
<td>Low-income status (Pell Grant Eligible)</td>
<td>0 = No; 1 = Yes</td>
</tr>
</tbody>
</table>

**Analytic Strategy**

Descriptive statistics were used to summarize student demographics including age, race/ethnicity, sex, and low-income status. Mean, median, and mode were calculated using SPSS software. The standard deviation was also calculated to measure the variability of the covariates using SPSS software. Data was analyzed to consider the relationships between the variables and to compare the demographic statistics of the participants.

In order to identify the relationships and significant differences between the characteristics, chi-square and t-tests were conducted. A chi-square test for independence was used to analyze the association between the students who took the intervention of the transitional math course and those who did not on the outcome variables of GPA, retention, college math course-taking patterns, and whether the student passed their first college math course. A t-test
was used to determine the significance of the differences between the two groups in the sample. This will be calculated using SPSS software.

Binary logic regression models were used to analyze the relationship between transitional math course taking and the outcome variables, controlling for student age, sex, race, and income status. Binary logic regression was used because it can predict the probability that a dichotomous variable (i.e., retention or a passing grade) is related to the independent variable of completing a transitional math course (Agresti, 1996). This analysis was done using SPSS software.

**Limitations**

One threat to the validity of the data is the manner in which participation in transitional math courses was reported. Because student records are kept differently in K-12 districts than in college and the data systems do not have the ability to communicate, data is collected manually. K-12 districts submit class rosters and grades on Excel spreadsheets via email. To help mitigate this threat, manually collected data is cross-checked by both the MWC Early College Department and the Registrar's Office. Because this study uses data from only one community college district, it may not be generalizable to other community college districts, even if the demographic populations are similar. The study did not control for how students chose to take transitional math or what may have influenced that choice. Another limitation of this data is how their high school district identifies students as eligible to take transitional math. It cannot be verified that all of the transitional math placement policies (listed in Appendix A) or the teacher recommendation option for selection were not accounted for because the high school did not keep consistent records of this.
Significance

Developmental education in community colleges affects over 60% of students. Students who take developmental courses are less likely to complete their education. Additionally, developmental education has been shown to disproportionately affect students of color, low-income students, and first-generation college students. The failure of developmental education to assist in the preparation for a successful college experience is concerning for those students as well as those who fund higher education. As legislative solutions to this issue are enacted, it is important to track their effectiveness.

Transitional coursework is being offered in over 29 states and in various formats, yet very little research has been conducted on the postsecondary outcomes of the students who take the courses (Barnett et al., 2013). Although many states are implementing transitional coursework, research is limited, and mixed results have been found regarding effectiveness. Additionally, almost no research has been done on the transitional coursework implemented in Illinois. This study can add to the understanding of the effectiveness of the Illinois transitional coursework initiative.

The implementation of transitional coursework in the MWC district bears analysis for a number of reasons. Leadership at MWC has invested significant resources in the development and implementation of transitional math. The investment, although mandated by the state, is also seen as a tool for student success. The MWC strategic plan indicates that each partner K-12 school district will be offering at least one transitional math course by the year 2022. The analysis provided by this research study will assist in tracking this strategic goal.
This research will also assist MWC with validating a grant deliverable. MWC received a $675,000 grant for pathway development from the Community Foundation of Northern Illinois. Transitional math courses are embedded in many of the pathways. The goal of pathway development is to assist K-12 partners in offering dual credit as well as graduating students who are ready to take courses at MWC. Success in a transitional math course is a key component of college readiness.

The Illinois legislature recently passed legislation that complements the PWR Act: the Developmental Education Reform Act. This legislation requires all community colleges and universities in Illinois to submit a developmental education reform plan to the state by May of 2022 (Developmental Education Reform Act, 2021). Because MWC has a commitment to transitional math, making it a part of their reform plan is under consideration. This study will assist with tracking the effectiveness of developmental education reform at MWC.

Finally, from a global perspective, as the economy of the United States continues to move towards jobs that require a highly skilled and technologically savvy workforce, it will be important to research initiatives like transitional math that are designed to increase access to education in community colleges.
CHAPTER TWO
POST SECONDARY COURSE TAKING AND ACADEMIC PERFORMANCE OF
TRANSITIONAL MATH COMPLETERS:
A QUANTITATIVE STUDY OF STUDENTS IN ILLINOIS

Introduction

Developmental education in college is prevalent. Over 50% of college students are required to take remedial or developmental education before taking college-level courses (Adelman, 2006; Barnett, 2018; Chen, 2016). This requirement has multiple ramifications, including completion rates for a degree or certificate of only 10% for students taking required developmental education courses (Bailey et al., 2010). Issues like low completion rates have prompted governments across the United States to enact legislation crafted to reform developmental education. Since 1995, over half of the states have enacted legislation that directly reform developmental education practices (Education Commission of the States, 2019). Developmental education has been made optional in Florida with the passage of Florida S.B. 1720. Many states, including Tennessee, Indiana, West Virginia, Georgia, and Colorado, have crafted legislation that requires developmental education to be offered simultaneously with college-level coursework. Reform in placement practices, aimed at significantly reducing the number of students participating in developmental courses, has been implemented by 26 states (Education Commission of the States, 2021). Some states, like Kentucky, have legislated time limits of one semester or one course (Education Commission of the States, 2021).
In 2016, Illinois enacted legislation with a tenet that allows courses that can be taught at the high school level to count as placement into college-level coursework (PWR Act, 2016). These courses, called transitional courses, are designed to increase college readiness for high school seniors. As outlined by the legislation, K-12 districts must partner with the community college in their region to develop a high school transitional course that will replace any developmental education courses or sequences, allowing students who successfully pass the course to place directly into college-level coursework (PWR Act, 2016). Implementation of the PWR Act began with transitional math courses, and Illinois high schools must offer at least one transitional math course. To date, no research has been published on the influence of transitional math in Illinois. This study focuses on the legislated developmental education reform in Illinois by analyzing academic outcomes at one Illinois community college.

Specifically, this study aims to examine the academic outcomes of high school students from one community college district in Illinois who took a high school transitional math course designed to give them direct placement into a college-level math course. Given that the goal of transitional math is to allow students direct placement into college-level math courses, this study provides a correlational analysis of specific academic success metrics between students who took transitional math and those who did not take transitional math at one Illinois community college. In the context of this study, these academic success metrics include college-level math course enrollment, passing or failing the first college-level math course, first-semester GPA, and first-semester to second-semester retention. The following research questions guide this study:

1. What is the demographic profile of students who complete a transitional math program?
2. To what extent is students’ successful completion of a transitional math course related to their timing of taking the first college-level math course?

3. To what extent is students’ successful completion of a transitional math course related to their probability of passing the first college-level math course?

4. To what extent is the student's cumulative GPA related to the successful completion of a transitional math course after the first semester?

5. To what extent is students’ successful completion of a transitional math course related to their second-semester retention?

**Literature Review**

Two bodies of literature and an examination of the political context surrounding developmental education in Illinois inform this research. First, the literature on developmental education taught in college will be reviewed. Second, literature exploring college-level courses taken while in high school will be analyzed. Lastly, State of Illinois legislative actions regarding developmental educational reform will be detailed.

**Developmental Education and Students’ Academic Success**

Traditionally, colleges and universities address the issue of students who are perceived as academically unprepared by requiring them to take non-college-credit courses called remedial or developmental courses (Bailey et al., 2010). The National Center for Education Statistics (NCES) defines postsecondary developmental education as “courses in reading, writing, or mathematics for college-level students lacking those skills necessary to perform college-level work at the level required by the institution” (Lewis et al., 1995, p. 1). Colleges and universities typically define the level of readiness for their institution's coursework, usually by a score on a
standardized or placement test (Perin, 2006). Regardless of the measure, approximately 59% of students in community colleges and 33% at four-year institutions must take some developmental education (Chen, 2016). Research also shows that many students often choose not to take placement assessments, prohibiting them from taking college-level coursework (Bailey et al., 2010). Thus, developmental education can impede taking college-level coursework.

Developmental courses exist to prepare students to be successful in subsequent college-level courses. However, research shows that students who take developmental education are 74% more likely than non-developmental education students to drop out of college (Barry & Dannenberg, 2016). Only 20% of students taking developmental coursework complete the next level of college coursework within two years of taking the class (Complete College America, 2016). Additionally, less than 1 in 10 developmental students complete a bachelor’s degree on time (Schak et al., 2017). Finally, over 50% of students who take developmental education sequences fail to complete the sequence and thus never make it into college-level coursework (Bailey et al., 2010). Thus, research shows that developmental coursework presents several problematic issues regarding access to college-level coursework.

Many states have legislation that requires high schools and colleges to partner and address together the problem of students not completing college due to required developmental education. A 2017 survey showed that 39 states offered some form of transitional curriculum (Fay et al., 2017). Design options for courses center on two main areas: courses that will place students directly into college-level math after successful completion or courses that are designed to be prerequisites to college-level math (Barnett, 2018). Early results show that coursework
designed by the college and high school faculty together shows more success for student placement into college-level math (Barnett et al., 2018).

**Developmental Courses Taught as Transitional Courses in High School**

In partnership with community colleges, many school districts have developed coursework that students can take prior to graduation from high school that replaces developmental coursework (Barnett, 2018). These courses, typically called transitional courses, are designed for high school seniors to take in place of developmental college courses (Barnett et al., 2013). Over half of the states in the U.S. have some type of transitional course for high school students (Fay et al., 2017). Research shows that high school courses with a high correlation to college-level coursework, like advanced-placement courses, correlate with academic success in college (Woods et al., 2018). Further, students who took dual-credit courses in Indiana were less likely to need developmental coursework and had academic success early on in college (Stephan et al., 2015). Thus, demonstrated success with advanced-placement and dual-credit courses might lead to many states legislating high school transitional courses.

The potential misalignment between high school and college coursework content has long been a concern for researchers (Kirst & Venezia, 2001; National Center for Public Policy and Higher Education, 2010). Misalignment can occur for multiple reasons, one of which is that standards and course learning objectives conflict (Hoffman et al., 2007). Another reason transitional coursework may be more effective relates to course placement. For example, a common way to place students into college-level coursework is through standardized testing (Barnett et al., 2013). However, critics of standardized testing and other college readiness benchmarks quickly point to the fact that standardized testing often does not address what is
being taught in high schools, but rather what will be taught in college (Hoffman et al., 2007). Transitional courses are designed to address this misalignment.

Transitional coursework is offered in over 29 states and in various formats (Barnett et al., 2013). Two areas of research support the popularity of legislating transitional coursework. First, completing remediation in high school saves students time and money, which are predictors of college completion (Edgecombe, 2011). Secondly, transitional coursework is an accelerated form of education, allowing students to complete remediation in a shorter time frame. Completing accelerated remediation has increased enrollment and completion of gateway college courses (Jaggers et al., 2014). Although many states are implementing transitional coursework, research is limited, and mixed results have been found regarding effectiveness.

West Virginia enacted transition coursework legislation requiring statewide implementation of transitional math by 2012. However, a 2016 study showed that the intervention did not improve academic outcomes for students who took the course (Pheatt et al., 2016). City University of New York developed a program called At Home in College, which offers high school transitional math courses, wrap-around counseling, and academic support. Students were shown to have a slightly higher percentage of passing their first college-level math course if taken within one year of the transitional math coursework (Trimble et al., 2017). Tennessee implemented the Seamless Alignment and Integrated Learning Support (SAILS) program in 2013-2014, allowing high school students to take a developmental math course online in their senior year. Passing the high school course guarantees enrollment in a college-level course. Students who participate in SAILS are 29% more likely to enroll in a college-level course and complete 1.5 times more college courses than their counterparts (Kane et al., 2018).
Illinois enacted the Postsecondary and Workforce Readiness Act (PWR) in 2018, which includes a policy on transitional math coursework similar to Tennessee.

**Illinois Solution for College Readiness**

Forty-six percent of college students in Illinois need developmental coursework once they enter college (ISBE, 2017). Eighty percent of students who enroll in developmental education in Illinois do not earn a college degree, and the total cost of developmental college courses amounts to over 36 million dollars per year (Advance Illinois, 2016). State agencies chose transitional math as a solution to the high rates of remediation, citing research outlining low completion rates for students needing remediation and cost savings (ISBE, 2017).

The Illinois P-20 Council, a statewide partnership between public educational institutions, workforce representatives, and social service organizations, was formed in 2009 (Illinois P-20 Council, 2021). The P-20 Council's mission is to

> deliberate and make recommendations to the Governor, Illinois General Assembly, and state agencies for developing a seamless and sustainable statewide system of quality education and support, from birth through adulthood, to maximize students' educational attainment, opportunities for success in the workforce, and contributions to their local communities. (Illinois P-20 Council, 2021, About Us section)

The P-20 Council set a goal to increase the number of Illinois adults with a postsecondary degree or credential from 51% to 60% in 2025 (Illinois 60 By 25 Network, 2020). Through the efforts of the P-20 Council, House Bill 5729 (HB5729), also known as the PWR, was created, passed unanimously, and signed into law on July 29, 2016 (Advance Illinois, 2016).

The Illinois PWR Act emphasizes collaboration between ISBE and the Illinois Community College Board (ICCB) to deliver transitional math and English coursework. K-12 districts in Illinois must partner with the community college in their region to develop a high
school transitional math course that will replace any developmental education courses, allowing students who successfully pass a transitional math course to be placed directly into college-level coursework (PWR Act, 2016). A comprehensive implementation plan was jointly created by ISBE and ICCB that includes funding, professional development, and implementation timelines for transitional math courses (ISBE & ICCB, 2019).

Students qualify to take transitional math based on a comprehensive rubric that includes completion of state requirements for graduate math courses, grade point average, and standardized placement test scores (ISBE et al., 2018). The development of three math pathways addresses the alignment between secondary and postsecondary course outcomes. The first is algebra based and leads to placement in college-level algebra; a second is quantitative literacy based and leads to college-level statistics; and the third is based on technical math, which leads to college-level technical math required for many career and technical education (CTE) pathways (ISBE et al., 2018). State-developed guidelines include comprehensive details for placement, course content, teacher qualifications, and portability of courses (ISBE et al., 2018). The PWR Act is a comprehensive legislative educational reform bill designed to impact many high school students in Illinois, particularly those who are at risk of not having success in college. Given the breadth and scope of this bill, it is important to understand how the PWR Act may influence the academic outcomes of students affected by it.

**Theoretical Framework**

Academic momentum theory, the speed at which a student persists in completing a bachelor's degree (Adelman, 2006), influences this study. A longitudinal study focused on academic momentum was conducted by Clifford Adelman in 2006, aimed at exploring which
variables are related to the likelihood of bachelor’s degree completion, such as initial college course load, high school academic preparation and enrolling in college courses while still in high school (Adelman, 2006). Further research on longitudinal student academic progression and degree completion corroborates Adelman's initial findings (Attewell et al., 2012). Three guiding tenets are critical to academic momentum theory. The first tenent examines the path of trajectory to degree completion by defining the initial course load a student takes combined with their progression from the first semester to the second semester. Secondly, academic momentum is a strong predictor of degree completion, even after the factors of socioeconomic characteristics and pre college achievements are taken into account. A final tenet is student patterns of enrollment (e.g., continuous enrollment versus stopping out) and specific academic activities (e.g., taking summer courses) that influence academic momentum (Attewell et al., 2012). Further, Adleman found that once a student has accumulated one year's worth of college credits in a twelve-month timeframe, the factor of a student's demographic profile becomes a modest predictor of degree completion (Adelman, 1999). Thus, academic momentum theory focuses on the speed of progression and continuity of enrollment as it relates to degree completion.

Academic momentum theory can help explain the impact of successful completion of a transitional math course on college course taking, semester-to-semester retention, and passing college-level math. Transitional math courses are designed to accelerate the timeframe for completion and enable students otherwise deemed not college ready to take more college courses in their initial semester, thus promoting academic momentum. Illinois does not require four years of math for graduation, but transitional math courses can fill the gap during a student’s senior year to start building academic momentum for college. Further, dual-enrollment activities, where
high school students take courses that count towards both high school and college completion, also have a positive influence on academic momentum. This appears to be especially true when students move uninterrupted from high school to college (Wang et al., 2015). Transitional math courses are designed to be a bridge to college-level math courses, encouraging academic momentum. Examining the effect that taking a transitional math course has as a steppingstone for attaining other academic milestones can help determine whether transitional math, in effect, jumpstarts academic momentum.

**Method**

This quantitative study examined the relationship between students’ completion of a high school transitional math course, designed to give students direct placement into a college-level math course, and their postsecondary academic outcomes. This study used descriptive analysis to address research questions. Descriptive analysis helps analyze data at the implementation stages of an initiative like PWR transitional math because it can provide practitioners and policymakers with relevant information (Creswell, 2015). Descriptive analysis can assist in identifying patterns in data that have not been recognized before (Loeb et al., 2017). Finally, using descriptive analysis research to assist in establishing a correlational relationship for intervention can be useful (Loeb et al., 2017). This study assists in determining a correlational relationship between the intervention of transitional math and student postsecondary academic success.

**Data Source and Sample**

This study used secondary data from Mid West College's (MWC; a pseudonym) information systems and software databases. When studying the correlational relationship between an established intervention and students’ academic performance, it is appropriate to
utilize secondary data (Creswell, 2015). Data was provided without any personal identifiers. The secondary data used for this study was validated and initially collected to admit, enroll, and evaluate various academic measures of students. Data from the MWC Office of Institutional Research is standardized according to the Illinois Community College Board (ICCB) and the Integrated Postsecondary Education Data System (IPEDS) at the National Center for Education Statistics. Student data collected from the MWC Office of Institutional Effectiveness includes sociodemographic data, grades earned in transitional math classes, courses taken in the first four semesters at MWC, and first-semester to second-semester retention data. Household income status was determined by student residence zip code and the percentage of poverty listed for that zip code in U.S. census data outlined in Appendix B (United States Census Bureau, 2021). Zip codes were grouped according to census data by city or town; all zip codes are located in the defined area for the MWC community college district outlined on their website.

MWC is a two-year community college located in Illinois that serves over 4,500 students annually and offers courses in transfer, career, and certificate-based programs. The sample for this study included students enrolled in developmental math classes at MWC. After successfully completing the developmental math course, students in this sample also enrolled in at least one college-level math course at MWC. These students graduated from a high school in the MWC district between the 2019-20 and 2020-21 school years. The treatment group included students who completed a transitional math course in 12th grade and then enrolled at MWC (n =100). The control group consisted of students who attended MWC as well as took and passed a developmental math course at MWC after high school graduation (n=525). Students were chosen from the birthdate range (01/01/2001 – 12/31/2004) to produce a sample consistent in age with
students taking transitional math in high school. In other words, students who did not take a college-level math course were excluded from the sample.

**Variables**

As indicated in Table 2.1, the outcome variables for this study include a) the semester in which college-level math is taken, b) passing a first college-level math course, c) cumulative GPA after one semester, and d) first-semester to second-semester retention. These outcome variables are significant because the goal for students taking transitional math is to remove the barrier of entry into college-level math course enrollment and increase student retention and academic success (ISBE, 2017). The variable of which semester a math course is taken is measured as a discrete variable, representing the number of semesters between completing transitional or developmental math and taking a college-level math course. It is coded as 1 for first semester, 2 for second semester, 3 for third semester, and 4 for fourth semester. The first college-level math course grade is coded as 0 for failing and 1 for passing with a C or better letter grade. The cutoff grade of C is used because students must receive a C or better to continue to the next course in the sequence. The variable of cumulative GPA after one semester is continuous and is coded as reported to the nearest tenth of a percent. The first to second-semester retention is measured as a binary variable. If a student stayed enrolled in the second semester, it is coded as 1; otherwise, it is 0.

The predictor variable for this study is the intervention of a transitional math course. Students who took and completed a transitional math course in MWC District are coded as 1, and students who took a developmental math course at MWC are coded as 0. The criterion outlined in Appendix A determines eligibility to take a transitional math course.
The control variables for this study are the sociodemographic characteristics of the students. Based on variables that have been found to have a relationship with college academic outcomes in previous research, the variables included student biological sex, ethnicity/race, and poverty status of students’ residence address zip code (Barnett et al., 2018; Pheatt et al., 2016; Trimble et al., 2017; Woods et al., 2018).

Table 2.1. Description of Variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
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<tr>
<td><strong>Outcome Variable</strong></td>
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<tr>
<td>Semester in which college</td>
<td>1=first; 2=second; 3=third; 4=fourth</td>
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<td>math is taken</td>
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<td>Grade in first college</td>
<td>0=fail; 1=pass</td>
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<td>math course</td>
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<td>Cumulative GPA</td>
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<td>First semester to second</td>
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<td><strong>Treatment Variable</strong></td>
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<td>transitional math course</td>
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<td>in high school</td>
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<td><strong>Demographic Variable</strong></td>
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<td>Biological Sex</td>
<td>0 = Male; 1 = Female</td>
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<td>Race/Ethnicity</td>
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<td>Low-income status by Zip</td>
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</table>
**Analytic Strategy**

Descriptive statistics were used to summarize student demographics of biological sex, ethnicity/race, and low-income status. Descriptive statistical analysis provided the profile of students in the study, and student demographics were organized to explore tendencies and variability of characteristics. The chi-square test of independence was conducted to examine relationships between transitional math completion, passing of first college-level math course, and second-semester retention (Creswell, 2015). A Cramer $v$ test was conducted to measure the effect size for the chi-square test of independence, and a two-sample $t$ test and a Cohen’s $d$ test were conducted to analyze relationships between transitional math completion, first-semester GPA, and the semester the first college-level math is taken (Creswell, 2015).

**Limitations**

One threat to the validity of the data is how completion of a transitional math course was reported. Because student records are kept differently in K-12 districts than in college, and the data systems cannot communicate, data is collected manually. K-12 districts submit class rosters and grades on Excel spreadsheets via email. To help mitigate this threat, manually collected data is cross-checked by the MWC Early College Department and the Registrar’s Office. Because this study uses data from only one community college district, it is not generalizable to other community college districts, even if the demographic populations are similar.

Another limitation of this data is not being able to control for all variables that can affect student academic outcomes. For instance, one of the options for placement into transitional math is teacher recommendation. High schools are not required to keep consistent records of teacher recommendations; thus, this option for placement into transitional math cannot be accounted for.
Another variable that could not be controlled for is the determination of students’ poverty status. Although the zip code in which the student resides can indicate the income range in the student’s household, it is not as accurate as declared income or Pell eligibility status. Access to data indicating financial aid status is not readily disclosed, but if it can be obtained, it would offer a more precise measure of an individual’s poverty status. Finally, to address limitations in data collection practices, future research could explore how statewide longitudinal databases are utilized to track students as they transition from high school into college.

**Findings**

**Descriptive Analyses**

Descriptive rank and file data to analyze how quickly all students took a college-level math course after taking transitional or developmental math is outlined in Table 2.2. The data shows that, in both, over 70% of the students took a college-level math class following the transitional or developmental course in the first semester. The percentage of students taking a first college-level math class in subsequent semesters falls below 15% for both groups.

<table>
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<th>Course</th>
<th>Developmental Education</th>
<th>Transitional Math</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Semester</td>
<td>386</td>
<td>73</td>
</tr>
<tr>
<td></td>
<td>73.52%</td>
<td>73.00%</td>
</tr>
<tr>
<td>Second Semester</td>
<td>79</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>15.05%</td>
<td>5.00%</td>
</tr>
<tr>
<td>Third Semester</td>
<td>37</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>7.05%</td>
<td>12.00%</td>
</tr>
<tr>
<td>Fourth Semester</td>
<td>23</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>4.38%</td>
<td>10.00%</td>
</tr>
</tbody>
</table>

Students receiving a passing or failing a first college-level math course data is analyzed in Table 2.3. Students in both groups passed the class at a higher rate than students who failed. The developmental education group passed at a rate of 71% and the transitional math group passed at a rate of 81%. 
Table 2.3. Pass First Math Course

<table>
<thead>
<tr>
<th></th>
<th>Developmental Education</th>
<th>Transitional Math</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fail</td>
<td>150</td>
<td>19</td>
</tr>
<tr>
<td>Pass</td>
<td>375</td>
<td>81</td>
</tr>
</tbody>
</table>

Next, data reporting the cumulative GPA after one semester is analyzed in Table 2.4. This data shows that transitional math students distributed as follows: \( n = 21, 21\% ; n = 19, 19\% ; n = 16, 16\% ; n = 25, 25\% ; n = 19, 19\% ; M = 2.65; SD = .93 \). Developmental education students were distributed as follows: \( n = 82, 15\% ; n = 79, 15\% ; n = 142, 27\% ; n = 140, 26\% ; n = 82, 15\% ; M = 2.68; SD = .83 \).

Table 2.4. Grade Point Average

<table>
<thead>
<tr>
<th>Grade Point Average</th>
<th>Developmental Education</th>
<th>Transitional Math</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;2.0</td>
<td>82</td>
<td>21</td>
</tr>
<tr>
<td>2.0-2.49</td>
<td>79</td>
<td>19</td>
</tr>
<tr>
<td>2.5-2.99</td>
<td>142</td>
<td>16</td>
</tr>
<tr>
<td>3.0-3.49</td>
<td>140</td>
<td>25</td>
</tr>
<tr>
<td>3.5-4.0</td>
<td>82</td>
<td>19</td>
</tr>
<tr>
<td></td>
<td><strong>525</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

Finally, the outcome variable of the first-semester to second-semester retention for the 100 students who took transitional math and the 525 students who took developmental math are outlined in Table 2.5. The data illustrates that developmental students had a second-semester retention rate of 71\% and transitional math students had a retention rate of 59\%.

Table 2.5. First-Semester to Second-Semester Retention

<table>
<thead>
<tr>
<th>First-Semester to Second-Semester Retention</th>
<th>Developmental Education</th>
<th>Transitional Math</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>147</td>
<td>41</td>
</tr>
<tr>
<td>Yes</td>
<td>378</td>
<td>59</td>
</tr>
</tbody>
</table>

Descriptive characteristics of 100 students who took transitional math and enrolled at MWC and 525 students enrolled in MWC developmental math are illustrated in Table 2.6. The
biological sex of the students was not evenly split, and females represented a higher percentage in both the developmental education group (65%) and the transitional math group (56%). The data illustrated that three racial groups, White, Black or African American, and Latinx, predominantly represented students from both the transitional math and developmental math groups. MWC does not require students to disclose their ethnicity, and approximately a third of students did not disclose their ethnicity/race.

Table 2.6. Biological Race and Sex

<table>
<thead>
<tr>
<th>Biological Sex</th>
<th>DE</th>
<th>TM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>179</td>
<td>44</td>
</tr>
<tr>
<td>Female</td>
<td>346</td>
<td>56</td>
</tr>
<tr>
<td>Race</td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>204</td>
<td>37</td>
</tr>
<tr>
<td>Black or African American</td>
<td>51</td>
<td>6</td>
</tr>
<tr>
<td>Latinx</td>
<td>95</td>
<td>16</td>
</tr>
<tr>
<td>Asian or Pacific Islander</td>
<td>10</td>
<td>1</td>
</tr>
<tr>
<td>American Indian/Native Alaskan</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Non-Resident Alien</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Did Not Disclose</td>
<td>162</td>
<td>38</td>
</tr>
<tr>
<td><strong>TOTALS</strong></td>
<td><strong>525</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

The distribution of students in the district zip codes is represented in Table 2.7. Percentages of students in each zone were inconsistent between the transitional and developmental groups. Zone 1, the largest population zone in the district, was represented at a rate consistent with the population size of the area in the developmental group (n =281, 53%) but lower (n =17, 17%) in the transitional math group. In the smallest population area, the students were represented inconstantly in the developmental group (n =6, 1%) and in the transitional group (n =36, 36%).
Table 2.7. Poverty Rate by Zip Code Zone

<table>
<thead>
<tr>
<th>Zip Code Zone</th>
<th>Population</th>
<th>% Population in Poverty</th>
<th>Developmental Education</th>
<th>Transitional Math</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zone 1</td>
<td>147,441</td>
<td>21.80%</td>
<td>281</td>
<td>53.52%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>17</td>
</tr>
<tr>
<td>Zone 2</td>
<td>46,078</td>
<td>10.06%</td>
<td>54</td>
<td>10.29%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Zone 3</td>
<td>3,459</td>
<td>14.70%</td>
<td>42</td>
<td>8.00%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Zone 4</td>
<td>24,932</td>
<td>13.50%</td>
<td>111</td>
<td>21.14%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>20</td>
</tr>
<tr>
<td>Zone 5</td>
<td>26,072</td>
<td>8.30%</td>
<td>11</td>
<td>2.10%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>13</td>
</tr>
<tr>
<td>Zone 6</td>
<td>1,384</td>
<td>14.60%</td>
<td>20</td>
<td>3.81%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>8</td>
</tr>
<tr>
<td>Zone 7</td>
<td>3,601</td>
<td>8.30%</td>
<td>6</td>
<td>1.14%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>36</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td></td>
<td>525</td>
<td>100.00%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>100</td>
<td>100.00%</td>
</tr>
</tbody>
</table>

Chi-Square Test for Independence

First, a chi-square test for independence was conducted to analyze the relationship between the predictor variable of taking a transitional math class on the outcome variable of the first-semester to second-semester retention. The chi-square test is appropriate for this analysis because 0 squares have a value of less than 5, and observed counts are different enough from expected counts to be significant. The analysis aims to determine whether there is a relationship between the two variables. The results of Pearson’s chi-square revealed a statistically significant association between transitional math taking and retention, $\chi^2 (1) = 6.75; p < .01$. The Cramer’s $\nu = 0.10$, indicating that the effect size was small. This finding indicates that transitional math completion has a weak association with students’ first-to-second-semester retention.

A second chi-square test was conducted to analyze the relationship between the predictor variable of transitional math course taking and a passing grade in a first college-level math class. The results of Pearson’s chi-square analysis showed a statistically significant association
between the variables, \( x^2(1) = 3.90; p < .05 \). The Cramer’s \( v = 0.08 \) effect size shows a weak association between transitional course completion and passing the first college-level math class.

**Two-Sample T-Test**

Two \( t \)-tests were conducted to examine the relationships between the predictor variable and the time lapse between taking transitional math and college-level math and students’ grade point averages after the first semester of college. A \( t \)-test is appropriate for this analysis because conditions of inference are met due to the samples being random, independent, and sufficiently large for the level of skewness, between -2 and +2 (George & Mallery, 2010). The skewness of the time lapse to taking a college-level math course is 1.35 for the transitional math group and 1.94 for the developmental math group. The skewness of grade point average after the first semester is -0.51 for the transitional math group and -0.83 for the developmental math group.

A two-sample \( t \)-test was performed to compare the semester time lapse in taking a college-level math class in the transitional math group and the developmental math group. Results of this test are shown in Table 2.8. The hypothesis that there is no difference between the groups is rejected and the \( t \)-test shows there was a statistically significant difference in the mean score for the time lapse to taking a college-level level math class between transitional math with Cohen’s D showing that the effect size is small. The transitional math group is as follows: \( M = 1.62, SD = 1.05 \), and developmental math group is as follows \( M = 1.41, SD = 0.79 \); \( t_{121} = 1.87, p = .03; d = .25 \).
Table 2.8 Time Lapse to Taking College-Level Math Course

<table>
<thead>
<tr>
<th></th>
<th>n</th>
<th>Mean</th>
<th>SD</th>
<th>t-cal</th>
<th>T-crit</th>
<th>df</th>
<th>p</th>
<th>Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transitional math students</td>
<td>100</td>
<td>1.62</td>
<td>1.05</td>
<td>1.87</td>
<td>1.66</td>
<td>121</td>
<td>0.03</td>
<td>Reject</td>
</tr>
<tr>
<td>Developmental math students</td>
<td>525</td>
<td>1.41</td>
<td>0.79</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

A second two-sample t-test was performed to compare the grade point average after the first semester taking college-level math in the transitional math group and the developmental math group. Results are shown in Table 2.9. The hypothesis that there is no difference between the two groups is accepted because there was not a significant difference in the grade point average between the transitional math group ($M = 2.65, SD = .93$) and the developmental math group $M = 2.68, SD = .83$; $t(131) = .28, p = .39; d = .03$.

Table 2.9 Grade Point Average After First Semester

<table>
<thead>
<tr>
<th></th>
<th>n</th>
<th>Mean</th>
<th>SD</th>
<th>t-cal</th>
<th>T-crit</th>
<th>df</th>
<th>p</th>
<th>Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transitional math students</td>
<td>100</td>
<td>2.65</td>
<td>0.93</td>
<td>0.28</td>
<td>0.28</td>
<td>131</td>
<td>0.39</td>
<td>Accept</td>
</tr>
<tr>
<td>Developmental math students</td>
<td>525</td>
<td>2.68</td>
<td>0.83</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Discussion and Implications**

Developmental education reform will likely continue to be a focus for colleges and universities, in part because there is a large body of research surrounding failed academic success rates of students taking developmental education (Bailey et al., 2010; Barry & Dannenberg, 2016; Complete College America, 2016; Schak et al., 2017). In addition, over half of states have some form of transitional education, indicating a high level of interest in
developmental education reform (Barnett, 2018; Fay et al., 2017). The loss of academic momentum as developmental students fail courses or stop out will continue to spur solutions, like transitional math, aimed at increasing academic momentum. While research exists outlining the failure of developmental education students to complete their education, little research exists regarding the success of alternatives to developmental education. This research aimed to understand the postsecondary behaviors of high school students taking transitional math. Understanding the impact that transitional math can have on academic outcomes is useful as colleges and universities consider alternatives to developmental education. The findings of this study present mixed results regarding the effect that transitional math course completion has on academic outcomes.

Regarding the timing of taking the first college-level math course, transitional math students and developmental math students take college-level math courses at relatively the same rate of (73%) in the semester directly following the developmental or transitional course completion. However, course-taking patterns in the following semesters differ between the groups, and this difference probably contributed to the significant difference in the group mean. Developmental education students follow a declining linear progression (15% within two semesters, 7% within three semesters, and 4% within four semesters), but 22% of transitional math students take a college-level math course in the third or fourth semester after completion. Although the effect size of this difference is small, this result indicates that students are more likely to persevere when initial course loads are stacked closely together during their college enrollment (Attewell et al., 2012). A factor that may have impacted transitional math students’ course-taking patterns is the 18-month expiration on transitional math class placement directly
into college-level math, prompting students to take advantage of the placement before it expires. In other words, because many school districts did not have transitional math in place until 2020, high school graduates who completed transitional math courses in 2021 have until Spring 2023 to redeem their transitional math credits as placement evidence. Due to this policy, the positive influence of transitional math on college-level math enrollment may be underestimated.

When it comes to students’ probability of passing the first college-level math course, the findings indicate a statistically significant difference between the two groups in the study, with a small effect size. While 71% of developmental education students passed their first college-level math course, 81% of transitional math students did so. These results support the research that shows that students taking high school coursework with a high correlation to college coursework have higher levels of academic success (Edgecombe, 2011; Woods et al., 2018). The result also supports the belief that aligning high school and college coursework will produce academic success for students (Kirst & Venezia, 2001). The results of this study are consistent with other studies where students who took transitional courses were found to have greater academic success (Trimble et al., 2017; Kane et al., 2018; Jaggers et al., 2014). According to academic momentum theory, this result also supports the effect of transitional math on the speed of completing a degree (Adelman, 1999). Further, this finding supports the PWR Act’s original intent of creating transitional courses that would allow academically underachieving students to have greater success in college coursework. It also supports the high school and college collaboration model mandated by P-20, supporting the view that aligned curriculum can set students up for academic success in college, consistent with several other research studies (Hoffman et al., 2007; Kirst & Venezia, 2001; Stephan et al., 2015)
However, for students’ first-semester cumulative GPA, the analysis does not show a significant relationship with cumulative grade point average after the first semester. This research shows that transitional math students were not any more likely to have a different grade point average after taking the intervention of transitional math. This result is consistent with other research finding that transitional course completion did not have an effect on academic outcomes (Pheatt et al., 2016). A possible explanation for this finding is that students did better in the math course where a targeted intervention was applied, but no better in other courses without the aid of additional support. This finding suggests that transitional math is at least neutral to academic success and that, when considered with the positive relationship to passing the first college-level math course, it at least supports early academic success.

Finally, for students’ second-semester retention, this study shows that transitional math students are retained from the first semester to the second at a lower rate than the developmental math students. There are several plausible explanations for this. The transition from high school to college can be especially difficult for students who have been receiving targeted interventions because once they are in college, they no longer have the additional support or daily contact with teachers. Also, during the time of this study, COVID forced all courses at MW to be offered online. It is plausible that students tried out one semester online and then chose to stop and wait for more in-person classes to be offered.

**Recommendations for Practice and Future Research**

The results of this study can add to understanding the effectiveness of the Illinois transitional coursework initiative. Transitional coursework is offered in over 29 states and in various formats, yet very little research has been conducted on the postsecondary outcomes of
the students who take the courses (Barnett et al., 2013). Although many states are implementing transitional coursework, research is limited, and mixed results have been found regarding effectiveness. Furthermore, almost no research has been done on the transitional coursework implemented in Illinois. Although the results of this study regarding the academic success of transitional math students are mixed, there are strong associations between transitional math course completion and a student’s overall success. Retention, passing the first college-level math class, and the speed at which college-level math is taken are promising indications that transitional math has a positive influence on student academic success.

Legislators in Illinois seeking a greater understanding of the impact of the PWR Act, specifically the transitional math implementation and academic outcomes, should support further research efforts. Given the statewide requirements to offer transitional courses, assessing academic impacts should be made a priority. Of specific concern is the difficulty in data sharing between K-12 districts and community college districts. Further support in developing statewide systems that can accomplish data sharing while also protecting personal information is critical to fully being able to assess the impact and the outcomes of the PWR Act. This research made use of data collected through the Illinois State Board of Education and Illinois Community College Board. Further consideration should be given to how these two systems can share data to assess the academic progress of students.

The implementation of transitional math coursework in the MWC district warrants further analysis for several reasons. Leadership at MWC has invested significant resources in developing and implementing transitional math. The investment, although mandated by the state, is also seen as a tool for student success. The MWC strategic plan indicates that each partner K-
12 school district will offer at least one transitional math course by 2022. The analysis provided by this research study will assist in tracking this strategic goal. Further, strategies can be developed to address the weak associations between the timing of course-taking and persistence. For instance, students completing transitional math in the spring of their senior year can be offered special incentives to take college-level math in the summer or fall, increasing the possibility of success and retention.

This research will also assist MWC with validating a grant deliverable. MWC received a $675,000 grant for pathway development from the Community Foundation of Northern Illinois. Transitional math courses are embedded in many of the pathways. Pathways development aims to assist K-12 partners in offering dual-credit and graduating students ready to take courses at MWC. The results of this study can be reported to validate student success regarding course grades and overall grade point average.

Illinois recently passed legislation that complements the PWR Act and the Developmental Education Reform Act. This legislation requires all community colleges and universities in Illinois to submit a developmental education reform plan to the state by May 2022 (Developmental Education Reform Act, 2021). Because MWC is committed to transitional math, this study can help make it part of its reform plan. This study will assist with tracking the effectiveness of developmental education reform at MWC by considering the descriptive analytics of the developmental students.

One area of interest highlighted by this study is that, when transitional math was an option for high school students, 525 chose not to take it and to instead take developmental education upon entering college. Although this study did not validate that all 525 students came
from area high schools, the percentage of in-district students at MWC stands at 96%, so an assumption can be made that the vast majority of these students come from the high schools that offer transitional math. MWC may wish to analyze these students to determine their reasons for not choosing to take transitional math. Such an analysis can help inform the crafting of pathways and course delivery in the future. This research also shows that 40% of students taking college-level math do so in the first semester after taking transitional math. Exploring ways of offering transitional math and college-level math either in tandem as a corequisite or as a linked sequence would be warranted.

An area of particular interest for further examination is the descriptive analysis of the zip code zones of poverty levels. The highest percentage of transitional math students comes from Zip Code Zone 7, with the lowest poverty rate (n =36, 36%). Conversely, only 17% of students from the highest poverty rate zip code took a transitional math class (n =17, 17%). Additionally, Zip Code Zone 7 had the highest percentage of participants in the transitional math group (n = 36, 36%) while at the same time the lowest percentage of participants in the developmental math group (n = 6, 8.3%). This result may be indicative of a district that fully implemented transitional math to the benefit of a large majority of its students. That is to say, only six students from that zone were not able to take advantage of direct placement into college-level math. Since one of the stated goals of the PWR Act is to ease the burden of the cost of college by offering developmental math to high school students tuition free, this area calls for further examination (PWR Act, 2016). This is especially true in the MWC district, where districts in high-poverty zones did not implement transitional math as robustly as Zone 7.
From the State's perspective, research to determine whether the implementation of the PWR Act impacted academic success metrics should be a priority. Given that this is a statewide initiative to increase educational attainment for Illinois residents and it has been in place for over five years, relatively little is known about its effectiveness or outcomes. This study points to a few promising correlations to academic success, but much more evidence is needed to promote continued implementation. Finally, from a global perspective, as the economy of the United States continues to move towards jobs requiring a highly skilled and technologically savvy workforce, it will be important to research initiatives like transitional math designed to increase access to education in community colleges. Given that this study shows a strong relationship with passing grades, further work can be done to ensure that transitional math is implemented to the fullest extent possible.

**Conclusion**

This study explored the relationship between students taking a transitional math course and academic success metrics during their first two years in college. The demographic characteristics of biological sex, ethnicity/race, and poverty level were analyzed with descriptive statistics. The taking of a transitional math course was found to have a strong relationship with the academic success metrics of semester-to-semester retention, passing the first college-level math course, and the time lapse between taking the college-level course. A student’s overall GPA after the first semester was not strongly associated with completing the transitional math class.

The literature on developmental education paints a bleak picture regarding the completion rate of students, as they are 74% more likely than non-developmental education
students to graduate (Barry & Dannenberg, 2016). Other statistics point to only 1 in 10
developmental students completing a bachelor’s degree (Schak et al., 2017). This study points to
some promising outcomes that taking an alternative developmental course like transitional math
can have on academic success. Administration at MWC can use this study to further analyze both
developmental and transitional math students’ academic success and devise strategies to reach
more students eligible for transitional math.
CHAPTER THREE

SCHOLARLY REFLECTION

Introduction

In this chapter, I will reflect on the process of this dissertation, look at my motivations for the research, reflect on the structure and goals of my study, and discuss the challenges I faced regarding the data - what worked well and what I might consider if I were to start the process over. Next, I will discuss my thoughts on how this study can be applied to my professional practice. Finally, I will share my experiences with conducting scholarly research and the opportunities afforded to me because of this experience.

Reflection on Motivation for This Dissertation

Over the past 15 years in my work as a postsecondary administrator, I have been deeply immersed in various aspects of educational reform. I began my professional journey over 30 years ago, rooted in active learning theory as a kindergarten teacher with training from the HighScope Educational Research Foundation. The HighScope method focuses on creating an environment with learning materials for a child to explore; the teacher is a facilitator and observer of interactions with materials and peers (Schweinhart, 2005). My career started at a time when active learning was not popular. Young children were expected to sit in rows, memorize, color within the lines, and follow the teacher's rules. I was not teaching in that traditional way, and I passionately believed that the HighScope method was highly effective. Given this, it is not surprising that I have continued to pursue learning about ways that education can evolve, change, and improve.
As my career progressed and I moved from teaching young children to teaching child development at the community college level, I shifted my professional focus to adult learners. I saw many students’ struggles in easing back into education if they stopped for a few years after high school. In 2011, I became an academic administrator at a community college in a region with a poverty level of 24% and a high school graduation rate of 61-65%. The region also has a lower than state or national average of college-educated adults. Many of the students at my college were there to earn a credential, certificate, or career degree so that they could get better jobs and make a sustainable living wage. It became apparent to me how difficult it could be for students who had been away from school, even for a couple of years, to get back into the educational groove. I began to notice that it proved to be especially difficult for students in developmental education courses, especially developmental math.

As an administrator in the STEM career field, one of my first big projects was a partnership with Northern Illinois University and regional employers to build a pathway for students to get bachelor's degrees in mechanical engineering. Engineering degrees are driven by math. A lengthy sequence of algebra, trigonometry, three calculus courses, and a differential equations course needs to be completed before students take most engineering content courses. If a student could not place into a college-level math course due to a bad test score, the completion time for an engineering degree could be stretched by more than a year. At first, I thought that if students are not good at math, they should not get into engineering. Then I met a young adult who worked in engineering as a manufacturing engineer for a well-known company in our region. This person was knowledgeable and had loads of successful practical engineering experience, including engineering very complicated parts for airplanes. This student was
considering returning to college to earn a degree so they could have a better salary. The only thing stopping them was that they didn’t want to take the math placement test. The thought of taking developmental education as an adult was so off-putting to them that they just decided not to try. I tried to convince them they did not have to worry. After all, they must be good at math to figure out how to engineer such specific parts. They told me they knew they were good at math but hated standardized testing and always did poorly when taking those types of tests. No amount of cajoling could make this student change their mind, and they stayed working at a job making far less money for doing essentially the same work a degreed person was doing. This student made me think differently about how we require students to access an engineering degree.

I began to look at ways to reduce barriers for adult learners to taking college-level math courses. As I started reading the growing body of research on developmental education, I learned that I was not alone in believing that perhaps we needed to rethink how we delivered developmental education to our students. I read dozens of research articles exploring developmental education as a barrier to student retention and completion, some even identifying it as the most significant barrier to completion (Complete College America, 2016). I became increasingly intrigued by alternative ways for students to overcome this barrier.

In 2018, I worked with a regional educational consortium called the P-20 Network at Northern Illinois University. One of my responsibilities was to help the region implement the PWR Act, where I was introduced to the concept of transitional math courses (PWR Act, 2016). PWR encourages K-12 districts to work with community colleges to deliver developmental math and English coursework before high school graduation. That same year, I started my doctoral journey at NIU, and my four-year immersion into developmental education and transitional math
began. That student who had chosen not to take steps to further their career because they were reluctant to take developmental education never left my mind. Moreover, one year after I began my doctoral coursework, I returned to my administrative position at the same community college. I decided to do something to help that student and all others like them by learning as much as possible about developmental education and then working to explore ways to minimize any effect it had as a barrier to student success.

**Reflection on Structure and Goals**

My first task was determining whether I would do a qualitative or quantitative study. The institution in this study was an early adopter in partnering with K-12 districts to implement transitional math, and transitional math courses were running at several high schools. I was unable to ask for specific data until my research proposal was accepted, but I needed a general understanding of the size of the population of students in transitional math to determine if I could do a qualitative study. The Early College Department at the institution reported in a public board meeting that several hundred students were taking transitional math. Thus, I could make an educated guess that there would be enough students to run a quantitative study, and I began to think about data collection.

Because I have been intimately involved with this work for several years, I knew data collection would be complex. The sharing of data between K-12 districts and postsecondary districts is a tricky minefield, full of issues involving access to data on minor children, access to adult educational data that is protected by the Federal Education Rights and Privacy Act, and other technical barriers between data management systems (Daggett, 2008). I was also aware that many institutions, including the one in this study, relied on data collected through emails
between teachers and college staff and then recorded by hand in spreadsheets, making accurate data collection a concern. Knowing that I could be taking on a daunting task, I first had to determine how to structure the study based on likely attainable and accurate information.

A further consideration was the theoretical basis for this study. Many studies focusing on alternatives to developmental education, like transitional math, are based on the human capital theory (HCT). HCT theorizes that improvements in the economic metrics of society require investment in the humans who live in that society, namely investments in job training and education. In turn, individuals also benefit from higher wages and perceived higher quality of life. HCT theorists argue that an educated population is more productive (Schultz, 1971). Although this is an interesting framework, obtaining wage and quality-of-life information did not seem feasible in the context of a dissertation. My dissertation chair, Dr. Hu, suggested that I explore the theory of academic momentum, which ultimately provided this study’s framework.

I found that research questions flowed more naturally when considering them in light of the academic momentum theory. My main concern here was framing questions that would address the types of data that I was likely able to obtain. The main obstacle I encountered in this phase was ensuring that students could be identified as they transitioned from the K-12 system to MWC. I discovered that MWC had been tracking students as they transitioned manually, so I was able to determine that I could obtain the data I needed.

**Application to Professional Practices**

Transitional coursework is offered in various formats in 29 states (Barnett et al., 2013). The PWR Act is the Illinois plan to address greater access and affordability for high school students transitioning into college (PWR Act, 2016). Given the proliferation of transitional
coursework and MWC's commitment to its implementation, consideration of practical applications seems essential. I will group the applications for this research study into three main practice areas. The first is data collection, and I will discuss several benefits that could be gained by crafting a data collection system that is not dependent on keeping information manually in Excel. The second area of application to practice is around admissions and recruitment and potential benefits to MWC in considering the transitional courses mandated by the PWR Act as an admissions tool. The final area is several suggestions that MWC could consider to encourage more students who take traditional math to realize the educational benefit.

Data collection, particularly in tracking Illinois students as they transition from K-12 systems into postsecondary systems, is something that many institutions grapple with. As MWC is crafting new ways of approaching developmental education, accurate data collection will assist with the assessment of the effectiveness of each initiative. One solution to consider will be creating databases of students enrolled in transitional math classes in the student management system. MWC's student management systems allow students not yet enrolled to be entered into their systems as potential students. An effort can be made to encourage all students in transitional courses to be entered into a data pool that codes them as such. The state has mandated that a course code be attached to the K-12 transitional course, which could be used to earmark the students as being eligible for direct placement into college-level math. Not only would this allow for accurate reporting of the academic success of these students, but it would also enable academic advisors to access this information when making course and placement recommendations.
As an administrator, I had access to transitional math course rosters provided by K-12 districts to the Early College Department at MWC. These rosters indicated that well over 500 students took transitional courses over the two-year period of this study. On the other hand, this research shows that 100 students took advantage of the benefits offered by taking a transitional math class in high school, namely bypassing costly developmental education and directly entering college-level math courses. That leaves over 400 students who did not obtain the full benefits of passing a transitional math course. These students represent an excellent potential applicant pool for admissions. Many strategies could encourage these students to enroll at MWC, including taking blocks of classes geared toward transfer credit or certificate credit.

The PWR Act is crafted to affect all Illinois high school students, and the sample for this study indicates that only a small fraction in this district participated in transitional coursework. Most of the 525 students in the developmental math group represented in this study would all have been candidates for transitional math courses. The results of this study indicate that further work is needed to understand how the provisions of the PWR act could effectively reach more students in the MWC district. Information sessions with high school counselors could assist in a better understanding of which students should be placed into transitional math courses. Additionally, the parents of the students can be made aware of the cost savings they can realize if their student takes transitional math while still in high school. During these sessions, admissions professionals could also educate parents on other ways in which MWC could help their child be successful in college, regardless of what their end goal for education is.
Application to Research

I reflect on the beginnings of my coursework for my doctorate. I recall reading research articles and understanding neither the abstract nor conclusion sections. I now have a much greater appreciation for those in-between sections. The level of thought and effort involved in the research process is quite rigorous, requiring movement between the abstract and the concrete on many different levels. I am also more aware of the level of collaboration it takes to accomplish a piece of research. From conception to design, from data collection to synthesis, completing this research study resembled being a general contractor and building a house. Planning, execution, attention to detail, and then relying on many factors coalescing to a finished product, research is not something that is accomplished in a vacuum.

Research is also not something for the faint of heart. There are many detours and roadblocks that must be overcome to accomplish a finished product. For instance, I needed approval from two Institutional Research Boards for this project. One board had a very straightforward application, and I received approval in about three weeks, while the other was not quite as streamlined, and I did not get approval for over 10 weeks. During much of that time, I could not accomplish much toward this study. Staying on task and focused can be challenging when there is downtime. Other areas required a block of time to be built in, for instance, during the revision process for each research section. Managing time effectively while maintaining momentum and motivation can be complicated and may not always progress linearly. Having people to support and encourage me to stay on the course proved vital.

I also gained insight into adult learners’ many difficulties in completing their education. All of my previous college experience was at a time in my life when I was younger, without
children, and at the beginning of my career with fewer responsibilities. I have a total of six adult children and a job with way more responsibilities than I had when I was getting my past education. Most students at MWC have personal lives as complicated as mine, if not more. This research project has given me tremendous respect for their journeys and also caused me to consider looking at ways in which we, as a community, can do a better job of supporting and encouraging them to accomplish their educational goals.

Conclusion

Overall, the process of completing a dissertation has been a very rewarding one. I could truly learn a large amount of information on a topic I had a great passion for. I could take what I was reading and researching and apply it to what I was doing daily for my job. I was also able to see that the issues I was facing in my professional life were echoed across the country and that others were as concerned about crafting solutions to these issues as I was. In some sense, the dissertation journey has been like being a part of a learning community. In addition to meeting and talking with others in the community, you also read and learn, and then think of ways to apply what you are reading and learning to your professional situation.
REFERENCES


Stephan, J. L., Davis, E., Lindsay, J., & Miller, S. (March 2015). *Who will succeed and who will struggle? Predicting early college success with Indiana’s student information system*. 


APPENDIX A

TRANSITIONAL MATH COURSE ADMISSIONS QUALIFICATIONS
The following are ways that a student can qualify for placement into transitional math. A high school junior who has successfully completed state graduation requirements and meets at least two of the criteria below is projected to be ready for college-level coursework when arriving at a postsecondary institution in Illinois.

- B or better in high school Algebra
- C or better in course higher than Algebra 2
- GPA > 3.0
- Standardized assessment: Math SAT or PSAT >530 or Math ACT > 22
- Placement test scores (such as ALEKS, Accuplacer, Compass, local placement instrument, etc.) into college-level math at the partner community college after taking their placement exam
- PARCC Math score of 4 or 5
- Teacher and/or advisor recommendation of college-level math in the senior year

APPENDIX B

NORTHERN ILLINOIS UNIVERSITY IRB APPROVAL
Exempt Determination

08-Apr-2022
Gina Caronna (01855428)
Counseling, Adult and Higher Education


Dear Gina Caronna,

Your application for institutional review of research involving human subjects was reviewed by the Office of Research Compliance, Integrity, and Safety on 08-Apr-2022 and it was determined that it meets the criteria for exemption 4.

Although this research is exempt, you have responsibilities for the ethical conduct of the research and must comply with the following:

Amendments: You are responsible for reporting any amendments or changes to your research protocol that may affect the determination of exemption and/or the specific category. This may result in your research no longer being eligible for the exemption that has been granted.

Record Keeping: You are responsible for maintaining a copy of all research related records in a secure location, in the event future verification is necessary. At a minimum these documents include: the research protocol, all questionnaires, survey instruments, interview questions and/or data collection instruments associated with this research protocol, recruiting or advertising materials, any consent forms or information sheets given to participants, all correspondence to or from the IRB, and any other pertinent documents.

Please include the protocol number (HS22-0359) on any documents or correspondence sent to the IRB about this study.

If you have questions or need additional information, please contact the Office of Research Compliance, Integrity, and Safety at 815-753-8588.

Please see the RIPS website for guidance on the impact of COVID-19 on research(including face-to-face data collection) https://www.niu.edu/divresearch/covid /index.shtml
APPENDIX C

MID WEST COLLEGE IRB APPROVAL
4/25/2022

Gina Caronna
400 Billings Ct
DeKalb, IL 60115


Dear Ms. Caronna:

Thank you for submitting the completed research request packet in support of the above named study.

The submitted documentation was reviewed by the Institutional Review Board (IRB). It has been determined that the research activities described in your application meet the following criteria for exemption:

☐ Research conducted in established or commonly accepted educational settings, involving normal education practices [Exemption 45 CFR 46.101(b)(1)].
☐ Research involving the use of educational tests, survey procedures, interview procedures, or observation of public behavior [Exemption 45 CFR 46.101(b)(2) or (b)(3)].
☒ Research involving collection or study of existing data, documents, records, or pathological or diagnostic specimens [Exemption 45 CFR 46.101(b)(4)].
☐ Research studying, evaluating, or examining public benefit or service programs [Exemption 45 CFR 46.101(b)(5)].
☐ Research involving taste and food quality evaluation or consumer acceptance studies [Exemption 45 CFR 46.101(b)(6)].

Your study has been approved for one year. Should the need to continue beyond this year arise, you will need to resubmit research request documentation to the IRB.

Furthermore, this approval only applies to the research study as submitted. Any modifications to your study other than those discussed during this review (e.g., changes to your consent form, surveys, or data to be collected) need to be submitted to the IRB for review and approval before they are initiated.

If you have any questions or need further assistance, please feel free to contact me.

Sincerely,