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University Interdisciplinary Linked Block Schedules and Developmental Student Success

Linda S. Reeves-Wymer
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Walden University

College of Education

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Linda S. Reeves-Wymer

has been found to be complete and satisfactory in all respects,
and that any and all revisions required by
the review committee have been made.

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Walden University
2023

Abstract

University Interdisciplinary Linked Block Schedules and Developmental Student Success

by

Linda S. Reeves-Wymer

EdS, University of Hartford, 1986

MA, University of Hartford, 1983

BA, University of Massachusetts, 1975

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Education

Walden University

June 2023

Abstract

Developmental education is the starting point for many 1st-year college students, especially from underrepresented, low-income, and first-generation populations. One such 1st-year program linked block-scheduled academic skill-development courses with a required interdisciplinary general education science course where instruction was provided simultaneously in a lecture format to college-ready nondevelopmental students and developmental students in three skill-development courses: reading, writing, and combined reading/writing. Although this program had existed for over 20 years, the effectiveness of the program, meaning whether the linked skill-development courses were associated with academic success, had not been assessed. Guided by Tinto's integration theory, a causal comparative design with the chi-square test for independent samples was used to determine if there were differences in passing rates for a census sample totaling 505 developmental and nondevelopmental students in the science course for the fall semesters, 2008 to 2012. Chi-square was significant, $\chi^2(3) = 19.481$, $p < .001$; Cramer's V = .196 reflected a small to medium effect size. Post hoc pairwise tests of two proportions indicated the science passing rates for the reading (73%, $n = 171$), writing (73%, $n = 46$), and combined reading/writing group (68%, $n = 107$) did not differ from each other but were significantly lower than the nondevelopmental group (85%, $n = 181$). Results may lead to a review of linked courses in the 1st-year program to determine if changes are needed to assist in meeting the needs of developmental students to persist and graduate, and may be used by other higher education institutions to develop strategies such as linked block schedules to assist students to be successful in school and in life.

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Dedication

The completion of my doctoral degree is a milestone and a dream come true. I want the younger generations to also dream, and to pursue their dreams, without regard to environmental distractions. Be patient, persistent, and determined.

I dedicate this dissertation to my late mother, Barbara June Calhoun-Reeves-Desmond-Clarkson, who, in her own way, was a role model of determination and achievement. She would be proud and happy to know that I finished the journey.

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I cannot give enough high praise or too many thank-yous to my committee chairperson, Dr. Vicki L. Underwood. Her leadership and professionalism guided and showed me how to be a researcher and an educator. She has truly earned my utmost respect as an outstanding professional who makes positive impacts on her students as well as in higher education and society.

I also want to thank Dr. Stacy Wahl and Dr. Richard Hammett for their roles as my committee members. Their critiques were always clear and timely. The various perspectives strengthened the research.

There are many persons at the university who assisted me throughout this venture and reminded me how important the results of this study are for 1st-year students, faculty, and administrators. They never let me lose focus. I especially want to thank Ms. Julie Cruz, who stood as a beacon at all times. I also want to thank my colleagues, especially Dr. Patricia Harkins-Pierre, Dr. Kimarie Engerman, Dr. Emily Carter, Dr. Vincent Cooper, Dr. Malik Sekou, Dr. Kathleen Dudemaine, Ms. Dian Levons, Dr. Marilyn Moore and the late Dr. John Moore, Ms. Mary Alexander, Ms. Joan Sereika; and my family, especially Mrs. Elizabeth Desmond-Weathers, for their continuous support and encouragement.

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Chapter 1: Introduction to the Study

Developmental students are persons who, upon high school graduation, are underprepared for college success, or who left postsecondary academics and are returning to college (Hu & Hu, 2021). The developmental 1st-year program at a historically Black college and university (HBCU), referred to as “the University,” supported these underprepared 1st-year students through interdisciplinary linked learning community block schedules in reading and writing to help them to persist, matriculate, and graduate with a college degree. According to the University catalog, *block scheduling* is an instructional process where students are grouped into learning communities to learn the academic and other skills needed to complete the 1st-year program successfully. Using block schedules in learning communities builds skills by connecting developmental coursework with college-level courses (Gebauer, 2019). First-year students in a block schedule learning community, unlike those enrolled in independent courses, can become more connected with faculty, be more involved in academic and social success, and improve "their learning at levels that exceed their non-at-risk peers" (Gebauer, 2019, p. 3). Block scheduling, developmental education, and student success have a long history separately and collectively.

The topic of this study was developmental student success through use of university linked block schedules. This study needed to be conducted to identify if the practices for interdisciplinary linked block schedule courses afforded developmental students the same pass rates as nondevelopmental students in college courses. The study

resulted in findings from data inclusive of developmental linked (also called *paired* or *corequisite*) courses and nondevelopmental interdisciplinary courses that may be generalizable to other 4-year institutions. Successful course outcomes for both developmental and nondevelopmental student groups can influence student retention (do Carmo Nicoletti, 2019). Paired or corequisite courses in learning communities can facilitate positive social, academic, and psychological interactions, which result in persistence (do Carmo Nicoletti, 2019; Rubush & Stone, 2020). Supporting developmental students to be academically successful and persist to graduation may result in positive social change by increasing the positive influence of social engagement and economic opportunities for graduates.

Higher education spends millions of dollars preparing developmental students for college courses (Barringer-Brown & Lynch, 2022; Ganga et al., 2018; Mokher et al., 2020). Although the money is being spent, questions remain concerning the outcome of the students' learning—retention and persistence to graduation or dropping out before completing college. In this study, I addressed the issue of whether the invested resources in learning communities and interdisciplinary linked block schedules made a difference in developmental students’ pass rates in a college course. The sections that follow in Chapter 1 will include the background, problem statement, purpose of the study, research question (RQ) and hypotheses, theoretical framework for the study, nature of the study, definitions, assumptions, scope and delimitations, limitations, significance, and a chapter summary.

Background

Academic underpreparedness is a concern for many 1st-year college students (Hassel & Ridout, 2018). Developmental education, which includes remedial courses in reading, writing, and mathematics during the 1st year of college (Ran & Lin, 2022), is a primary means of delivering instruction to support students who enter college without the prerequisite skills (Woods et al., 2019). The Center for American Progress reported that 40% to 60% of incoming 1st-year college students required remediation in one or more developmental courses (Gebauer, 2019). Populations most affected include ethnic and racial minority or underrepresented, low-income, and/or first-generation college students (Pearson et al., 2022; Xu et al., 2018). Developmental education has been a persistent need at the University. The percentages of incoming 1st-year students who required developmental skill classes at the University for Fall 2009, 2010, 2011, and 2012 were 84%, 79%, 82%, and 85%, respectively. More recent University data indicate the continued need for developmental education for incoming 1st-year students, affecting 71% of these students for Fall 2018, 71% for Fall 2019, and 80% for Fall 2020.

Brower et al. (2021) stated that developmental education is more than providing remedial math and English courses prior to students entering college-level courses. It is a holistic approach to assist underprepared students and provides services such as "learning assistance centers; tutoring, specialized learning workshops about topics such as time management or study skills" (Brower et al., 2021, p. 156). Additional support services may include advising, scaffolding course content, as well as providing coordination and

collaboration among higher education personnel (Brower et al., 2021). My research focused on the academic outcomes of developmental education students who needed these types of support in a 1st-year academic college course.

Daugherty et al. (2018) studied paired or corequisite English courses, using both developmental and college English. Results indicated that students in corequisite courses had greater success in both developmental and college English courses. May et al. (2021) reviewed research on developmental programs, finding that developmental students in accelerated paths completed remedial work in a shorter time and enrolled in college-level math and English courses sooner. Accelerated developmental students completed college courses in 3 years and had more success than nonaccelerated students. The authors found that defining factors included well-trained faculty, interactive content, and complete student support services. May et al. noted that improvement of developmental students' persistence and college graduation rates included increased student motivation.

Developmental education was traditionally taught as individual skillsets without college course content included (Gebauer, 2019). However, costs and additional time in college needed for developmental education generated concerns regarding accurate placement, college curriculum, and nondegree credits at 4-year institutions (Brower et al., 2021; Ran & Lin, 2022). These and other issues caused student retention after the 1st year to be problematic, especially for underprepared students (Cholewa et al., 2017), leading to additional efforts to have 1st-year students more quickly reach college-level courses and remain in college (Gebauer, 2019). Redesigned developmental curricula

include learning communities and college courses that are "modularized, contextualized, compressed, and corequisite" (Woods et al., 2019, p. 7). Although there are various types of learning communities, the primary purposes are to increase academic support and personal connections (Gebauer, 2019), which may positively influence retention, persistence, and graduation rates.

The linking of courses through learning community block scheduling has been part of the 1st-year program at the University for over 20 years. My study focused on the consecutive fall periods from 2008–2012 when the originally identified interdisciplinary general education science course was linked with English and team taught by two professors in the classroom simultaneously. The developmental learning community students carried 16 to 16.5 credits per semester, the same courseload as nondevelopmental students. In 2013, the linked corequisite classes remained, but based on budgetary considerations, there was a change in teaching format for the science course, with only one professor who presented a lecture to the developmental and nondevelopmental students, and the interdisciplinary learning occurred in the supplemental required lab led by teaching assistants. Although the nondevelopmental students were able to continue taking up to 16.5 credits, the developmental learning community students' credits were reduced to 12 to 12.5 per semester for the first semester to increase retention. A gap in practice existed because the effect of linking courses through learning community block scheduling on students’ academic performance had not been assessed. I addressed this gap in practice for the period of Fall 2008–2012 in this

study. This time period was selected because it allowed for a comparison of developmental and nondevelopmental students when courseloads were equivalent. Research on academic success rates of 1st-year students was needed to determine the effects of the block scheduled, linked classes. The results of this study may also serve as a catalyst for possible academic curriculum changes to advance developmental student learning at 2- and 4-year colleges.

Problem Statement

At the University, students were initially registered for classes based on scores on the Scholastic Assessment Test (SAT), American College Test (ACT), and/or the University's internal placement test. Students who did not meet minimum scores on these standardized tests were registered for developmental courses. All 1st-year students, including developmental students, were registered for a required, interdisciplinary, general education college-level science class in which all students needed to demonstrate comprehension of scientific literacy of the natural world, including disasters and ecosystems. The lack of basic skillsets can result in students failing required 1st-year academic courses, such as the general education science course. Because of the large percentage of 1st-year students with low reading and/or writing entrance test scores, the University implemented a 1st-year program to support academic and personal growth through interdisciplinary studies and community learning experiences. These experiences included supportive developmental reading and writing courses to augment the content area of the interdisciplinary linked college-level science course (Stentoft, 2017).

However, only developmental students were registered for the paired, linked, or corequisite reading, writing, or combined reading and writing developmental courses, which were an integral part of the University's learning communities. The research problem that was addressed in this study was whether the linked academic skill-development courses were associated with academic success, specifically whether there were any differences between pass rates for students enrolled in and not enrolled in interdisciplinary linked block schedules.

Although more than 70% of incoming 1st-year students at the University needed one or more developmental classes to become college ready, there had been no comparisons of academic outcomes of 1st-year students, linked and not linked to interdisciplinary block schedules for the general education science course. The results of this study have implications for possible academic changes in the 1st-year program or the general education science course.

Mokher and Leeds (2019) reported that 90% of the high school graduates who enroll in higher education are not prepared for college courses and noted that "86% … of college students believed they were college ready, but two-thirds were placed into developmental education courses" (p. 3). The authors compared developmental education to an "obstacle course" because the courses cost money but do not bear credit and slow students' credit-bearing academic advancement toward graduation (Mokher & Leeds, 2019, p. 3). Use of corequisite courses for developmental education is shown to be an effective means of enhancing students' skills while they are enrolled in college-level

courses (Ran & Lin, 2019). In 2015, the Tennessee Board of Regents became the first state college authority to provide evidence of academic success using remediation and corequisite course results from 13 community colleges (Ran & Lin, 2019). Additionally, 900 incoming students participated in a study on corequisite remediation reform at three City University of New York community colleges (Ran & Lin, 2019). Students were randomly assigned to participate in either remedial math or a corequisite college math course with workshops. The results indicated that students in the college math course with workshops were more likely to pass college-level math, attain more credits, and achieve higher graduation rates than the remedial math students (Ran & Lin, 2019). The pilot math program at a 4-year college in Tennessee found similar outcomes: Students in college-level corequisite math classes with support of workshops had improved academic outcomes from first to second semesters and 1st to 2nd years, as well as increased college credits (Ran & Lin, 2019).

According to Tinto (2017b), students can improve academically in a supportive learning environment. The use of corequisite courses and block schedules can create learning communities to provide the needed learning environment because they can be designed to target and to support students' academic learning, social integration, development of community, and comfort with institutional resources (Baier et al., 2019).

Purpose of the Study

The purpose of this quantitative study was to determine whether linked academic skill-development courses were associated with academic success, as indicated by

comparing pass rates in a required college-level course for students enrolled, or not enrolled, in interdisciplinary linked block schedules. For the combined fall semesters of 2008, 2009, 2010, 2011, and 2012, the final archived grades of students taking the general education science course were used to determine the pass rates (dependent variable) of the four instructional groups (independent variable) of the course. These four groups included the developmental support of block schedules for science with reading, science with writing, science with reading and writing, as well as the nondevelopmental, college-ready group with no support services.

Research Question and Hypotheses

The following RQ informed my study: What are the differences, if any, in the proportions of students passing the interdisciplinary science course among developmental 1st-year students in the three linked course block schedules and 1st-year students not in the linked course block schedules?

H_0: There is no statistically significant difference in the proportions of students passing the interdisciplinary science course among developmental 1st-year students in the three linked course block schedules and 1st-year students not in the linked course block schedules.

H_1: There is a statistically significant difference in the proportions of students passing the interdisciplinary science course among developmental 1st-year students in the three linked course block schedules and 1st-year students not in the linked course block schedules.

Theoretical Framework for the Study

Tinto's (2017a) integration theory reflects the experience of 1st-year developmental students because they often come to college with limited academic and social integration (Burke, 2019; Xu et al., 2018). Tinto (2017a) stated that integration into the college environment assists 1st-year students, especially populations who have been underserved in higher education, to remain and complete their degrees, but this requires student motivation in the forms of self-efficacy, belonging, and curriculum value in the student's life. Through learning communities and student organizations, students meet other students and have new college experiences in class and on campus (VanOra, 2019). Often, students realize they are underprepared for the academic rigor of college and need to enhance their self-worth through positive integration experiences (Xu et al., 2018).

In this study, I determined if there were differences in course outcomes as indicated by passing rates for the developmental, at-risk 1st-year students and the college-ready, not-at-risk 1st-year students in the required 1st-year interdisciplinary science course, which was linked through block schedules only for the developmental students. Tinto (2017a) noted that students can develop a sense of belonging and motivation through cohorts using required social experiences and academic experiences, such as learning communities and contextualization of the curriculum as used in the University's science course. These factors may enhance students' self-efficacy and the belief that they can remain, persist, and graduate from college. Tinto (2017b) also noted that institutions of higher education should be prepared to assist students with 1st-year

challenges as soon as possible. Thus, the University's 1st-year program reflected Tinto's theory of integration as applied to at-risk, 1st-year developmental students through implementation of block schedule learning communities linked to a general education science course. Comparing differences in performance of these at-risk developmental students to not-at-risk 1st-year students in the same science course reflects an application of Tinto's theory as well as an assessment of the course effectiveness. A more detailed discussion of the theoretical framework will be presented in Chapter 2.

Nature of the Study

The causal comparative design (Salkind, 2010) was used in this study to determine if developmental students taking a required 1st-year general education interdisciplinary science course linked to a reading and/or writing course in learning community block schedules passed at a rate equivalent to or different from nondevelopmental, college-ready students who were not in block schedules linked to a skills course but attended the same science lecture class. A causal comparative design was appropriate for this study because it allows the researcher to identify relationships between independent and dependent variables after the occurrence of the event (see Salkind, 2010), which in this case was the block schedule pairing of the skills courses with the science course.

The population for the study was 1st-year students enrolled in the general education science course during the fall semesters of 2008–2012. The dependent variable was the pass rates in the science course; the independent variable, instructional group,

had four levels: three block scheduled groups (science with reading, science with writing, science with both reading and writing), as well as one nondevelopmental group of students taking the lecture science course with no block schedule or developmental support. Archived data collected as part of the normal business of the institution were used to compare pass rates of the students in the four groups using the chi-square analysis for independent samples in SPSS software (see Laerd Statistics, 2016).

Archived data from the Office of Institutional Research and Planning were used to identify the students enrolled in the general education science course and whether they were also enrolled in the reading and/or writing linked courses during the fall semesters of 2008–2012. After data cleaning, there were 505 archived student records that included final grades identifying if a student passed or failed the general education science course. The deidentified data were divided into four groups comprised of the three linked sections for developmental students and one nonlinked section for the nondevelopmental college-ready students. The chi-square test for independent samples (see Laerd Statistics, 2016) in SPSS was used to determine if there was an association between passing or failing grades in the interdisciplinary science course and students' enrollment in one of the three developmental block schedules and nondevelopmental students not in block schedules, and more specifically, whether there were any differences between pass rates for students enrolled in, and not enrolled in, interdisciplinary linked block schedules.

Definitions

The following terms informed this study.

Block schedules: The traditional model of learning communities where "students take two or more linked courses as a group and work closely with one another and their professors" (Goodlad et al., 2019, p. 2).

Interdisciplinary instruction: "Entails the use and integration of methods and analytical frameworks from more than one academic discipline to examine a theme, issue, question or topic" (Goldsmith et al., 2018, para. 1).

Learning communities: The linking or pairing of two courses, usually one developmental and one nondevelopmental, so students have common academic and nonacademic experiences that create connections among the disciplines, students, and faculty (Opacich, 2019). Learning communities are structured to "support students as they work through the cognitive, social, and emotional challenges that are involved in transitioning to college" (Goodlad et al., 2019, p. 12).

Linked, paired, or corequisite classes: "Required courses that often have a high failure rate are linked with courses in a different discipline … and the goal is to link a skills-based course with the content course … registered through a learning community" (Holt & Nielson, 2019, p. 673).

Assumptions

Validity and accuracy of the research data and statistical techniques are required to have outcomes that are reliable and reproducible. "An assumption is a condition that is taken for granted without which the research project would be pointless" (Burkholder et al., 2016, p. 175). The following were assumptions for this study. It was assumed that

students in the 1st-year program needed academic assistance to meet the rigors of college success, and those students not enrolled in the 1st-year program did not require this assistance. It was also assumed that all students attended classes and tried their best on assignments and tests, which resulted in their final course grade reflecting their achievement.

Assumptions regarding faculty included that they were experienced and trained in working with developmental students and had the necessary resources with which to teach. Another assumption was that, as part of the paired-course model, faculty members communicated with one another regarding the interdisciplinary teaching style, syllabi topics, and timelines throughout the semester, and that they followed the syllabus without variation. It is also assumed that science grades were calculated and correctly recorded as well as retrieved accurately from the college records.

Scope and Delimitations

The scope of the study included the developmental and college-ready students who were enrolled in general education science during the five fall semesters from 2008 to 2012. The general education science course was a three-credit, interdisciplinary required course with up to 75 students per lecture for the two lectures per week and weekly field lab. This was a 1st-year lecture course with combinations of developmental students enrolled in either reading, writing, or combined reading and writing linked block schedule classes and nondevelopmental, college-ready students with no linked classes

taught in the same science classes. The learning community block schedules for the skill and content courses were on two campuses of the same institution.

The focus of the study was chosen because the linked block schedule approach to developmental education was used at this institution for many years, but its effectiveness had not been assessed. Only students enrolled in the developmental block schedules and their nondevelopmental peers also enrolled in the general education science course were selected for inclusion in this study. Although numerous theories have been developed to support developmental education (e.g., Rutschow et al., 2019; Schak et al., 2017), Tinto's (2017b) theory of integration fit best with the model of block scheduled linked developmental courses within learning communities that was assessed in this study because it addressed both the academic and social aspects of these learning communities.

As a land-grant HBCU, the University, like other HBCUs, focuses on diversity and inclusion; students report that they feel they belong at these institutions (Booker & Campbell-Whatley, 2019). Because of this specific focus, the findings of this study are generalizable for developmental 1st-year students taking a paired or corequisite developmental course with a different college-level course at this institution. Findings may also be generalizable to HBCUs and other institutions with similar characteristics.

The delimitations of the study are that the data were grades from one required general education science course at one institution with two campus locations. This course was selected because of the large number of students enrolled and because I was not involved with this course, which avoided possible conflicts of interest.

The social science general education course was not selected for inclusion in this study because the formats and class capacity of the two classes were different. Student capacity for the science course was 75 students, more than the student capacity of 25 for the social science lecture class. Additionally, I was chairperson for the social science course and did not want to have any possible conflict of interest regarding student grades.

Limitations

The limitations of this study include that the general education science course was a lecture class taught in English, but not all students at the University had English as their first language. The nature of the science course also required that students have appropriate use of skillsets such as study strategies and note-taking. The science lectures were delivered by two different full-time professors, one at each campus location. There was one full-time professor and several part-time professors for the reading, writing, and combined reading and writing courses on each campus. The delivery of the course topics was required to be consistent for each course section for alignment of instruction to the students. The professors were not to vary, modify, or omit content from the syllabus; however, this was not verified. Although the use of archival data reduced the possibility of bias affecting the study, it also precluded the possibility of collecting data to assess the fidelity of implementation of the instructional plan.

Significance

The findings from this study may aid leaders of 2- and 4-year colleges when designing programs for the increasing number of academically marginal 1st-year students

who begin college in preparatory or developmental courses. By promoting the use of innovative pedagogies and support services through advising, mentoring, and designing shared academic experiences through learning communities (also referred to as block schedules), student retention can be increased (Tinto, 2017a).

Learning communities shift away from traditional remediation and are designed to provide developmental students other learning modalities through pairing corequisite college-level courses with developmental courses. This curriculum builds on student knowledge and away from student deficiencies (Gebauer, 2019). The structure not only builds academic knowledge, but also enhances students' self-efficacy and focuses on building self-knowledge, relationships, and communication skills, which reduce students' fears of making mistakes while enhancing a culture of leadership (Gebauer, 2019).

At the University, the general education science course was a required course for all 1st-year students. Students who were taught together in block schedules while taking this course were part of the 1st-year program. The intent of the linked learning community block schedule was to enhance skills necessary for academic success. The outcome of this study determined if there were any significant differences in the pass rates of the four groups of students who attended the lecture-based 1st-year required interdisciplinary science course. With the four groups having taken the same interdisciplinary course simultaneously across the 5-year period, each fall from 2008–2012, the findings of this study indicated if the success rates of developmental students in block schedules were significantly different than those of nondevelopmental 1st-year

students not in block schedules. The findings may result in modifications to learning community block schedules or the linked interdisciplinary course for increased developmental student success. The outcomes are relevant to persistence and college graduation and can be used as a basis, or model, for programs at other 2- and 4-year institutions of higher education.

Summary

The 1st-year program at the University housed both developmental and nondevelopmental 1st-year students. It served as an entry level to college for students who were identified as developmental and in need of support services based on low placement test scores or having not taken college entry tests. Learning community block schedules linked the developmental students in developmental reading and/or writing courses with a college-level 1st-year general education interdisciplinary lecture-based science course in which both developmental and college-ready students were enrolled. Analyses of archived science final grades for students across the 5-year period of fall semesters 2008–2012 were used to determine whether the 1st-year program structure and courses resulted in pass rates for developmental students that were significantly different from the pass rates of the college-ready students. These findings can be used to determine the need for revisions to the program or courses. In Chapter 2, I describe the literature search strategy, theoretical foundation, and literature review related to key variables, and I provide a summary and conclusions drawn from the literature.

Chapter 2: Literature Review

The 1st-year program at the University included 1st-year students who were underprepared for college and were enrolled in learning communities that linked the college-level general education science course with a corequisite developmental course for reading and/or writing. The corequisite reading and/or writing courses used the content of the science lecture course to implement instruction on the respective skillsets. Science lectures also included college-ready students who were not in block schedules or linked to reading/writing classes. Although the linked blocked schedules were created to assist developmental students, the effect on students' academic performance had not been assessed, which created a gap in practice that was addressed in this study. The purpose of this quantitative study was to determine whether linked academic skill-development courses were associated with academic success, as indicated by comparing pass rates in a required college-level course for students enrolled, or not enrolled, in interdisciplinary linked block schedules.

While the effectiveness of paired courses is important for the success of academically underprepared 1st-year students at the University, it also has been a concern for other institutions of higher education. Colorado created developmental education with corequisite courses using the supplemental academic instruction model because approximately 40% of 1st-year college students enter underprepared (Reed, 2017). Florida had two thirds if its 1st-year college students beginning in developmental education courses, and less than half of the students completed the courses in 3 years

(Nix et al., 2020). These findings resulted in curriculum reform in community colleges and a national debate regarding the role and costs of developmental education in 2- and 4-year colleges (Nix et al., 2020; Woods et al., 2019).

Additionally, underprepared 1st-year college students in need of developmental education fostered the need for such nonprofit organizations as Achieving the Dream (2022a) and Complete College America (2022). These programs assist higher education faculty by providing training in teaching and learning to enhance student persistence and degree attainment (Achieving the Dream, 2022c). Higher education and nonprofit organizations are attempting to help 1st-year developmental students be better prepared for the rigors of college in efforts to increase persistence to graduation and reduce college costs (Achieving the Dream, 2022b).

Chapter 2 includes an expanded description of Tinto's (2017b) integration theory, the theoretical framework that grounded this study. Discussion of the literature search strategy, a literature review related to key variables, as well as a summary and conclusions are presented in this chapter.

Literature Search Strategy

The literature search strategy included locating peer-reviewed articles, primarily those published between 2017 and 2022, via electronic databases that included Education Source, ERIC, Gale Academic, One File Select, Google Scholar, ProQuest Central, Sage Journals, JSTOR, and EBSCO. Key words were used separately and in combination in initial searches and to create an alert system to capture new articles daily. These key

words included *Tinto integration theory, learning communities, developmental students, underprepared students, nondevelopmental/college ready students, college placement tests, first-year college, linked classes, cohort classes, first-year college paired classes, developmental education, higher education costs,* and *HBCU*. Ulrich's Periodical Directory was used to determine if the articles were peer reviewed.

Theoretical Foundation

Tinto's (2017b) integration theory is germane to programs for 1st-year developmental students because they often come to college without a sense of belonging (Hassel & Ridout, 2018; Xu et al., 2018). The integration theory posits that students, upon entering college, plan to graduate even if it is not from the initially enrolled institution (Tinto, 2017b). This theory was selected as the foundation for the present study because it addresses students' college experiences that affect their persistence, sense of belonging, self-efficacy, and perceptions that influence decisions of retention and transfer (see Ackerman, 2020; Tinto, 2017a).

The traditional student transition from high school to higher education can be stressful for all students. Tinto's (2017b) integration theory addresses academic as well as social integration in higher education. Both developmental and nondevelopmental students must complete the rites of passage: separation, transition, and incorporation (Pichon, 2019). Levels of independence and dependence on parents during the 1st year of college affect students' academic and social college integration. The more students are connected to parents, the less likely they are to integrate into and persist in the college

environment (Pichon, 2019). The factors that were found to relate to parents as facilitators of independence included gender, race, income, and education (Pichon, 2019).

Through learning communities and student organizations, students meet other students and have new college experiences in class and on campus (VanOra, 2019). Both inside and outside of the classroom, learning communities aid in forming student involvement in both academic and social integration (Virtue et al., 2019). Social events through informal peer associations and interactions with faculty positively affect student integration and persistence (Tinto, 1975). Students may realize that they are underprepared for the academic rigor of college and gravitate toward activities to enhance self-worth through positive integration college experiences (Xu et al., 2018).

The University of Utah initiated the Learning, Engagement, Achievement, and Progress (LEAP) program, which enrolled 1st-year students in learning communities (Diener et al., 2021). From 1999–2006, outcomes were compared for approximately 1,500 LEAP students and non-LEAP students matched on similar demographic and incoming characteristics. The authors reported that

> LEAP students earned better grades in their firsts year, attempted and completed more credit hours, were more likely than the non-LEAP students to return for their second year, and graduated at higher rates at both the four- and six-year marks. (Diener et al., 2021, p. 5)

Since 2011, retention and completion rates at the University of Utah went from 86% to 90% and 6-year graduation rates went from 55% to 70% for students who were in learning communities (Diener et al., 2021).

Learning communities have positive academic and social influences on 1st-year students. Long-term influences on students who participated in learning communities seem equally positive academically and socially. Tinto (1975) posited that social integration occurs through peer activities, extracurricular activities, and interactions with faculty and staff, which result in social rewards of friendships and faculty support that strengthen persistence.

Although most studies have focused on the effects of learning communities on 1st-year students, a study conducted at Western Carolina University found longer term effects. Five to seven learning communities were offered to incoming 1st-year students and included a minimum of three thematically linked courses to "enhance learning, foster connection, and integrate academic experiences by placing students and faculty in a section of intentionally grouped courses" (Virtue et al., 2019, p. 3). Interviews with junior and senior students identified four long-term outcomes: "relationships with professors, preparation for college, high-impact practices, and friendships" (Virtue et al., 2019, p. 5). Students described their relationships with professors as warm, comfortable, and caring, and they wanted to be like their professors; they maintained their relationships with the learning community faculty (Virtue et al., 2019). The participants who were in 1st-year learning communities (a) noted that the learning communities helped them to succeed in

their 1st-year events, (b) linked the experience with positive on-campus engagements, and (c) indicated that the learning communities helped them understand the expectations of college as well as be involved beyond the classroom (Virtue et al., 2019). High-impact practices included service-learning projects that kept the group connected beyond the 1st year; students became involved and helped in the local community (Virtue et al., 2019). The students also developed a group of friends who could be trusted and relied upon, and they enjoyed being in the company of the learning center group (Virtue et al., 2019).

College students' decisions to remain, persist, and graduate from an institution of higher education, or to withdraw from the higher education journey, are related to their satisfaction with varying components of the institution. Students' satisfaction with both the academic and social aspects of college influence the level of student integration at the institution (Tinto, 2017a). Student satisfaction and integration are different concepts but are related because satisfaction affects levels of assimilation, as do one's ability, skill sets, and personal qualities (Liu & Liu, 2000). To be an active and satisfied learner, students must successfully interact and be responsive to the academic and social environment (Liu & Liu, 2000).

It is sometimes difficult to identify when students need support, and what type of support they need. For example, social support may be needed for persistence of first-generation and low-income students or those who are nontraditional or part-time students (Tinto, 2017b). Social support can come from shared academic experiences, learning communities, or social activities held on campus or at community locations (Tinto,

2017b). Learning communities are intended to enhance levels of academic success and social integration, which can increase persistence (Xu et al., 2018). Achievement in academic performance is affected by students' engagement in learning and their perceptions of educators' attitudes and values (Tinto, 2017b). Engagement in learning affects academic performance through interactive behaviors such as attending and participating in class, completing courses among cohorts, interacting with faculty members, and partaking in study groups (Groccia, 2018; Xu et al., 2018).

When students reflect on their experiences, they need to recognize themselves as members of a community who are accepted and valued by the faculty, staff, and other students (Tinto, 2017b). When students realize they belong and are contributing and accepted members of the institution, they have more reason to persist, which enhances their own motivation and may positively affect the motivation of other students (Tinto, 2017b). In part because of the strong influence of positive student interactions, Tinto added student integration to his student persistence and departure model (Liu & Liu, 2000). These qualities demonstrate that students are willing to try to achieve and meet their goals of persistence and graduation from college.

Learning communities are an integral part of 1st-year programs because they facilitate students' engagement in shared learning and obtaining support when faced with academic or social difficulties. When difficulties arise, intervention methods to assist and to support students should be implemented as soon as possible to maintain student motivation (Tinto, 2017a), which is facilitated by the level of interaction within learning

communities. Learning communities also provide a sense of belonging where there are shared common interests, which may include extracurricular activities and peer-to-peer conversations that can facilitate student persistence and commitment to the institution (Nungsari et al., 2017; Tinto, 2017a). The curriculum and teaching practices of faculty instructing the learning community need to reflect quality and address pragmatic matters that may be of concern both now and in the students' future. This fosters student motivation to remain at the institution (Tinto, 2017a). Tinto's integration theory was used to ground my research because it was applied in the initial development and continued implementation of the 1st-year program at the University to ensure that students were supported, were encouraged to share interests, and stayed motivated in efforts to remain in college and to graduate.

Literature Review Related to Key Variables

First-Year Student Assessment and Placement

An increasing number of 1st-year college students graduate from high school but are not ready for the academic rigors of college (Woods et al., 2019). The Common Core State Standards Initiative assesses state-level literacy and works with educational leaders to plan and to provide postsecondary students with options of specialized training or a college education for career and leadership development (Chambers, 2020). National Assessment of Educational Progress (NAEP) data indicated that approximately "one-third of high school seniors graduate ready for college work in math and reading" (Chambers, 2020, p. 2) and only 82% of high school graduates met graduation criteria (U.S.

Department of Education, 2019a, 2019b), which may imply that some students graduated without high school graduation-level literacy in math and reading (Chambers, 2020). In addition to national data revealing that high school graduates are underprepared, approximately 35% to 40% of first-time-in-college students in the United States need academic support to be successful at the college level (Baier et al., 2019). The intent of this academic support is to assist students to pass college courses, persist, and graduate with a degree. At a time when higher education has financial constraints and many administrators doubt the need to create new or additional academic venues, an increasing number of 1st-year students need remedial, or developmental, instruction.

Developmental Education

In the 1920s, institutions of higher education began to expand efforts to attract and assist student populations from all backgrounds who had not attended college (Hallett et al., 2019; Schak et al., 2017). These students brought new college transition concerns such as lack of college knowledge and a limited sense of belonging due to being first generation or "historically marginalized because of race, socioeconomic status, and sex/gender identity" (Hallett et al., 2019, p. 231).

The influx of students came and sought the educational opportunity, but not all were able to meet the rigor of a college education (Schak et al., 2017). As the new college populations increased, so did student issues that needed to be addressed (Hallett et al., 2019). Developmental education was created as an educational strategy to assist underprepared students, with these college courses interchangeably referred to as

developmental education, *remedial education*, and *college-readiness courses* (Schak et al., 2017). The U.S. Department of Education recommended that underprepared students take courses to develop their skills in reading, writing, and/or math to obtain the skillsets needed for college courses (Barringer-Brown & Lynch, 2022). Although developmental courses often result in no college credits, they do allow open access to students who may otherwise not have the opportunity to attend college due to academic weaknesses (Barringer-Brown & Lynch, 2022). Developmental education enrolls a disproportionate number of ethnic and racial minority students, and course failure is common (Johnson & Stage, 2018; Sanabria et al., 2020).

Mokher et al. (2020) identified the annual cost implications of developmental education as $7 billion annually, which does not include any funding for support services. A study by Turk (2019), based on extensive national data, indicated that despite issues with developmental education, completing a sequence of developmental courses generally improved students' chances of earning an associate degree. However, this cost needs to be balanced with the findings from a 2013 study reported by Mokher et al. (2020) indicating that a person who attains an associate degree earns $200,000 more over their lifetime than a person who does not have a college degree. Barringer-Brown and Lynch (2022) noted that developmental education is critical because it allows for diverse opportunities to increase social and intellectual development. Further, students who do not complete their college degree may work in positions with lower pay scales, which can

limit their standard of living, as well as contribute "to a national education concern" (Barringer-Brown & Lynch, 2022, p. 2).

Traditional developmental education programs have prerequisite formats where students are tested and placed into either developmental, skill-based courses, often for no college credit, or college-level courses if they meet readiness standards (Schak et al., 2017). Also, in efforts to improve student success in developmental courses, some higher education institutions redesigned the courses to be corequisite, whereby students take a developmental course with a college course (Reed, 2017). Reform of developmental education can include voluntary inclusion in developmental education or not, placement testing or not, prerequisite developmental courses or corequisite courses, as well as academic and advising support services (Daugherty et al., 2018; Hartman, 2018; Park-Gaghan et al., 2020; Rutschow et al., 2019).

Developmental Students

Many 1st-year students entering college are not academically prepared to begin college courses and need to begin their academic journey in developmental preparation courses. Developmental education helps address the academic underpreparedness of students as they enter college at risk of dropping out (Whiton et al., 2018). While all students can be developmentally at risk, ethnic and racial minority, and low-income students are overly represented (Whiton et al., 2018).

Once underprepared students are accepted into higher education, the respective colleges and universities must assist them academically to be college ready by identifying

needs and supplying aid in the form of supplemental instruction and support services (Baier et al., 2019; Butrymowicz, 2017). Students' placement in 1st-year courses is generally based on achievement on the SAT or ACT, or standardized entry tests in English, reading, and math created to "reflect on the work students need to do to be ready for and successful in college" (Westrick et al., 2019, p. 5). Developmental course placement is most often the result of this testing, with courses commonly offered in reading, writing, and mathematics (Whiton et al., 2018). It is relatively common for 1st-year students to begin college with three or four developmental courses (Chambers, 2020). According to Butrymowicz (2017), some 1st-year students have several academic deficiencies and "to try to include them in a credit-bearing course without that foundation would be a disservice…and other students would be held back" (para. 13). Approximately 50% of all 1st-year college students and 70% of 1st-year community college students are required to take a developmental course (Chambers, 2020) and approximately 40% of college undergraduates overall enroll in one developmental course (Barringer-Brown & Lynch, 2022). Although the University is a 4-year institution, it offers 2-year or associate degrees, and accepts both college-ready and developmental students.

Developmental students, which include students with families, first generation, and racial/ethnic minorities, often come to college with unrealistic expectations (Hassel & Ridout, 2018). The transition to higher education can be stressful, result in low academic performance, and cause students to drop out (Hassel & Ridout, 2018). Such

students are often unaware of or in error regarding the amount of interaction they will have with faculty and staff, college class sizes, as well as being ill-prepared for studying, independent learning, and responsible for their own academic learning and development (Hassel & Ridout, 2018). Some do not know how to be successful students (Hassel & Ridout, 2018).

Students who take college readiness courses often need more than the classroom time and activities to be successful in their courses; institutions often provide supplemental developmental education support services such as tutoring, advising, and learning communities (Baier et al., 2019). The developmental courses, support services, and efforts of the faculty and staff can lead to outcomes whereby students who complete the developmental work and continue with college-level courses become college graduates (Baier et al., 2019) with completion rates reflecting students' determination to master literacy skills (Chambers, 2020).

Student success in developmental education is based on academic preparation and outcomes, as well as social and emotional growth (Perin & Holschuh, 2019). Developmental education can be viewed both as an opportunity and a barrier (Schak et al., 2017). The opportunity is for underrepresented college students to attain a higher education (Schak et al., 2017); the barrier is that students do not pass or complete the developmental classes and drop out of college (Cooper et al., 2019; Schak et al., 2017). Students who are enrolled in high-impact practices and taking two courses with the same cohort are "twice as likely to complete their degree within 6 years" (Johnson & Stage,

2018, p. 756) than students not enrolled in high-impact practices. There are also noncognitive factors that influence retention, including "academic behaviors, academic perseverance, academic mindsets, learning strategies, and social skills" (Bowman et al., 2019, p. 137). These noncognitive factors influence student retention through social and academic domains. Another factor that influences 1st-year students is procrastination. Students must monitor their behavior and the effects of their behavior. According to Ziegler and Opdenakker (2018), self-regulation enables persons to "control their behavior, monitor their actions, and adjust their performance…to reach set goals" (p. 72). Academic procrastination can create negative results, which can compound 1st-year students' activities and interfere with their adjustment to higher education. Delays can also occur if a student has personal or social responsibilities that compete with academic requirements (van Rooij et al., 2018).

First generation students constitute approximately one-third of the U.S. college population and are likely to be low-income, non-native English speakers, and members of racial/ethnic minority groups (Best Value Schools, 2021; Ives & Castillo-Montoya, 2020; Korstange et al., 2020). These student characteristics align with low academic performance and low degree completion (Markle & Stelzriede, 2020). First generation students also have lower retention and persistence rates than nondevelopmental 1st-year students. Students need to develop a sense of belonging during their transition to higher education, which aids in retention, especially with first-generation and Black students (Davis et al., 2019).

College-Ready/Nondevelopmental Students

College readiness aligns with 4-year college admission criteria such as high school grade point average (GPA), class rank, standardized test scores; and high school courses to include 4 years of English; 3 years of social science, natural science, and math; and 2 years of a foreign language (Klasik & Strayhorn, 2018). Placement tests are the traditional tool used to identify college-ready students who enter 1st-year college courses without the need for developmental courses (Woods et al., 2019). High schools may administer college preparation tests during the junior year and enroll students into developmental courses while in high school, so they do not need remediation in college (Woods et al., 2019). College-ready students also learn through social-emotional interactions and while gaining academic knowledge through development of concepts, risk-taking, and creation of an environment to overcome challenges (Adams, 2021).

College-ready/nondevelopmental students tend to be better adjusted in social-emotional well-being and adapt to the transition from high school to college more readily than developmental students (van der Zanden et al., 2018). These students often meet the predictors for 1st-year success, which include academic achievement as reflected in credits and GPA, critical thinking, and social-emotional well-being (van der Zanden et al., 2018). The enhancement of critical thinking is the continued practice of dialogue, solving authentic problems, and receiving mentoring (van der Zanden et al., 2018). Social-emotional well-being in developing adulthood is characterized by "identity

exploration, increased responsibility, and independent decision-making" (van der Zanden et al., 2018).

College-ready 1st-year students may also be more engaged with their studies, activities, peers, and the employees at the institution of higher education. Students who are engaged in their environment tend to be academically successful (Kahu & Nelson, 2018). The types of engagement include behavioral, psychological, cognitive, affective, sociocultural, critical, and political (Kahu & Nelson, 2018; Trowler et al., 2021). As noted by Tinto (2014), others have also found that "engagement matters" (Kahu & Nelson, 2018, p. 20). Johnson and Stage (2018) found that four of the 10 high impact practices that increased academic achievement and persistence through engagement were 1st-year seminars, writing requirements, service learning, and learning communities. The outcome of student engagement in on-campus and off-campus activities is persistence and learning (Ishaq & Bass, 2019; Kahu & Nelson, 2018; Kuh & Kinzie, 2018; Tinto, 2014), which leads to degree completion. College-ready 1st-year students may devote cognitive effort to academic tasks, use effective study strategies, and implement time management when planning for coursework and recreational events (Korstange et al., 2020).

Learning Communities

Learning communities are designed to include factors that lead to 1st-year students being academically successful, persistent, and graduating from college (Diener et al., 2021; Virtue et al., 2019). Developmental students who received additional

instruction were found to also need the engagement and social support of peers, faculty, and staff to feel connected to the institution (Baier et al., 2019). Learning communities assist with social and academic development of the full student and reduce stress through the fostering of a sense of belonging and community (Rima et al., 2019; Thomas et al., 2018). Students in learning communities have higher grades, enhanced intellectual development, and increased retention rates (Rima et al., 2019). The integration of these factors through learning communities increases college students' success (Baier et al., 2019).

Tinto (2017a) postulated that institutions of higher education can improve student persistence by creating a sense of belonging, so students see themselves as valued members of the institution and engage in academic and social activities. This engagement develops into a sense of commitment and builds into a caring community. Learning communities are intentionally created to allow 1st-year students the freedom to interact with peers and to develop relationships that bond the students together through common interests (Johnson et al., 2020). Learning communities "elevated students' sense of social belonging, academic skills and attitudes, and academic performance in gateway courses" (Johnson et al., 2020, p. 7). This bonding enhances self-efficacy for academic and social interactions (Tinto, 2017b), facilitating the positive effect of learning communities on at-risk students (Johnson et al., 2020).

The overarching theme of learning communities is shared learning among groups in a connected learning environment (Holt & Nielson, 2019). Learning communities are

identified as a high-impact teaching practice; 400-500 U.S. institutions of higher education have these programs (Rima, et al., 2019). There are five models of learning communities: "(1) paired or clustered, (2) smaller cohorts within larger classes, (3) coordinated or team-taught classes, (4) learning communities for special populations/interest groups, and (5) residential-based" (Rima, et al., 2019, p. 841). Positive interdependence can be created and included in learning communities. Positive interdependence is "when individuals recognize that achieving their goals is only possible if others, with whom they are collaborating, also achieve their goals" (Brauer & de Hei, 2021, p. 94).

Although a primary feature of learning communities is that students take two or more of the same courses together in block schedules during the same semester, the learning community can vary in scope based on the number of students included and instructional coordination of faculty members (Loughlin & Mascolo, 2019; Rima et al., 2019). In developmental learning communities, student cohorts are in the same classes, comprised of interactive and cooperative activities, and often create academic and social involvement outside of the structured class setting (Xu et al., 2018). Tinto (2017a) identified learning communities to be effective based on their use of active learning and student support groups, both inside and outside classes, that result in academic gains and increased retention among learning community students. Yet, students being in a learning community does not mean the desired educational outcomes will be attained (Holt & Nielson, 2019; Kern & Kingsbury, 2019).

First-year students in both general and specific learning communities experience positive outcomes. In 2015-2017, the Building Opportunities through Network of Discovery (BOND) students increased persistence and retention, enhanced student engagement, and reported increased sense of belonging, faculty interactions, and academic support (Cowan et al., 2022). In 2017-2018, a summer bridge program for social science resulted in 1st-year students having positive academic outcomes, a sense of belonging, and a higher number of earned credit hours than their peers (Davis & Laster, 2019).

Some learning communities are intended to enhance deep learning and abstract reasoning through interdisciplinary thematic learning to achieve student success (Baker & Pollard, 2020; Lanphier & Carini, 2022; VanOra, 2019). Learning communities can develop and enhance *growth mindset*, the belief that abilities "are not fixed…and skills are brought into existence through effort, perseverance, and hard work" (Loughlin & Mascolo, 2019, p. 3). However, learning communities can also have negative outcomes because developmental courses often do not carry college credit (VanOra, 2019), which can result in one or more additional terms being added to a student's academic plan. Additionally, if the student cohort is enrolled in all of the same courses, the students may not experience the full range of college experiences outside of the learning community (VanOra, 2019). Despite these possible drawbacks, students have positive views and like experiencing the learning opportunities with other learning community students (VanOra, 2019).

Although learning communities have become more numerous in higher education settings, the structures that assist students and maximize student outcomes are still elusive (Kern & Kingsbury, 2019). Research at 4-year colleges regarding the effectiveness of learning communities supports the use of the learning community model (Rima et al., 2019). A general assessment indicated learning communities need more definitive goals, implementation of team teaching with linked courses, use of an integrative curriculum with support services, and provision of training for instructors (Lanphier & Carini, 2022). Although much is known about learning communities, there is more to be known through more research and assessment (Lanphier & Carini, 2022) of 1st-year academic success and learning communities (Xu et al., 2018).

Developmental Linked Classes in Learning Communities

Linked, paired, or corequisite classes allow students to make connections between two subjects to create deeper understanding (Swanson et al., 2021). Learning communities often pair classes of reading or study skills with a content course to enhance the learning of developmental students (Swanson et al., 2021). Faculty teaching the paired courses coordinate the syllabi and assignments; the courses are usually taught separately but can be team taught (Swanson et al., 2021). Corequisite courses shift remediation, so students enter a college course and receive support services simultaneously to augment the course content (Daugherty et al., 2019). The reasons for this shift are to decrease the length of time in developmental courses, increase student persistence, and align support with college course needs (Daugherty et al., 2019).

Paired writing courses are often included in learning communities, use interdisciplinary context, and emphasize skills such as grammar, punctuation, and mechanics within an active learning context. Students may write assignments using content information from other colleges and schools. Paired reading courses use interdisciplinary context and emphasize skills such as conceptual vocabulary development, literal and critical thinking, and reading strategies. Students may also use content readings from other colleges and schools.

My study focused on the concepts of developmental education for 1st-year students presented through developmental linked courses within learning communities to address the needs of 1st-year students. In this study, I assessed whether the linked academic skill-development courses were associated with academic success, specifically whether there were any differences between pass rates in an interdisciplinary college-level science course for students enrolled in, and not enrolled in, linked block schedules. My study findings may assist in closing the gap in practice related to use of developmental education learning community class pairings for success of 1st-year developmental students.

Summary and Conclusions

Tinto's (2017b) integration theory explains that students will remain and persist at a college if they are included and feel welcome by faculty and peers, which also enhances their academic and social self-efficacy. Learning communities have been found to be effective in improving retention of students, including developmental at-risk students.

The 1st-year program at the University addressed the lack of college readiness of developmental students in areas of reading and writing through learning communities that linked a general education science course with skills classes in reading, writing, or combined reading and writing. However, the effectiveness of this approach had not been assessed and was the focus of this study. The outcome of this study may add more support to the continued use of learning communities to meet 1st-year students' academic needs through linked, or paired content and skills classes. Alternatively, if most developmental students in learning communities did not acquire sufficient support to pass the general education science course, then the curriculum and learning communities may be reviewed to determine possible reasons for the outcome. The results of my study may be generalized to other HBCUs and institutions of higher education that have first generation, low-income, or minority students.

Chapter 3 will include an introduction, discussion of the research design and rationale, as well as the methodology for the study. Threats to validity and ethical procedures will also be addressed, followed by a chapter summary.

Chapter 3: Research Method

The purpose of this quantitative study was to determine whether linked academic skill-development courses were associated with academic success, as indicated by comparing pass rates in a required college-level course for students enrolled, or not enrolled, in interdisciplinary linked block schedules. The general education science course pass rates of the 1st-year developmental block scheduled groups (science with reading, science with writing, science with both reading and writing) were compared to those of the college-ready nondevelopmental group of students taking the same lecture science course with no block schedule or developmental support. Archived institutional data for five fall semesters (2008–2012) were used to determine if the pass rates of the developmental students were equivalent to or significantly different from those of the nondevelopmental students. These results indicated if content support and learning community structures were useful for the developmental groups, or if modifications to these areas are needed to better support student success.

The remaining sections of Chapter 3 include the research design and rationale, methodology, threats to validity, and ethical procedures that were followed. The chapter ends with a summary.

Research Design and Rationale

In this study, I used a causal comparative research design. This design was selected because it is appropriate to use when the researcher desires to identify possible relationships between the independent and dependent variables after the occurrence of the

event (Salkind, 2010). This was the case in assessing whether the block schedule pairing of the developmental skills courses with the general education science course had any effect on student success (as measured by course pass rates) when compared to nondevelopmental students enrolled in the same science course. The independent variable was the four instructional groups of science students comprising students enrolled in the three different linked developmental skills courses and the nondevelopmental students not enrolled in a linked developmental course. The dependent variable was the science pass rates of these four student groups.

Methodology

A description of the learning community linked block schedules and aspects of the methodology specifically related to the retrieval and analysis of the data is presented in the following subsections.

Population and Sampling Procedures

Data for this study were retrieved from archived records for Fall 2008, Fall 2009, Fall 2010, Fall 2011, and Fall 2012 using a census sampling approach that included all student records from two campuses that met the selection criterion of enrollment in the general education science course during the fall terms from 2008 through 2012. After cleaning to remove incomplete and unusable data, 505 student records were retrieved for students registered for the science course as part of the University 1st-year general education requirement. The developmental students in this study were also registered for

reading, writing, or combined reading and writing based on their placement score results in these disciplines.

The Intervention: Learning Community Linked Block Schedules

Through learning community block scheduling, the 1st-year students at the University received an academic schedule that used placement test results to link, or pair, the students into developmental reading and/or writing course(s) with a required 3-credit college-level 1st-year general education interdisciplinary science course. The developmental writing course and developmental reading course each awarded one degree credit and three nondegree credits for English. Thus, students enrolled in the reading and/or writing courses received both degree and nondegree credits for each course, which created 4-credit courses. Each developmental course allowed up to 20 students per class; the science course allowed up to 75 students and was lecture-based with weekly out-of-class lab activities. Developmental students as well as college-ready, nondevelopmental students were enrolled simultaneously in the science lecture class.

Developmental students received the readings for the science lectures approximately 1 week in advance through their respective reading and/or writing course(s). The curriculum of the reading and/or writing linked course(s) was designed to teach and apply basic skills in reading and/or writing of the science course content. Through this link, the 1st-year students in the reading block schedules read and used study strategies to remember content. Students in the writing block schedules learned basic essay-writing patterns and wrote about the science content. Students in the reading

and writing block schedule used the study strategies and essay-writing patterns for science prior to receiving lecture content.

The science professors collaborated with the developmental reading and writing professors by providing the lecture articles and timelines for lecture topics. The developmental students received the science lecture readings 1 week in advance of the course content delivery. The students interacted with the information during the respective developmental reading and/or writing class activities. Thus, the courses were corequisite, or linked, and taught through interdisciplinary instruction (Goldsmith, 2018) that allowed students to address an issue from multiple perspectives. The developmental students also received support services through learning community block schedules that offered linked courses and incorporation of high-impact practices in education (Virtue et al., 2019). The learning community block schedules provided means for 1st-year students to experience the challenges and rigor of college life with support from other students in the same cohort with the institution's faculty.

Nondevelopmental students were also enrolled in the general education interdisciplinary science course but were not enrolled in linked courses and did not receive other developmental support services. All students enrolled in the general education science course were tested with the same materials and graded on the same grading scale.

Archival Data

After receiving approvals from the Institutional Review Boards (IRBs) of Walden University (#09-22-22-0351780) and the University (#1958760-1), I requested archival data for this quantitative study from student records housed in the University Institutional Research and Planning Department. Deidentified data included pass and fail grades for all students enrolled in the 1st-year required interdisciplinary general education science course for the five fall terms from 2008 through 2012. The data also included information specifying whether the students were enrolled in the reading, writing, or combined reading and writing developmental classes or were nondevelopmental students.

Data Analysis Plan

Deidentified data received from the University Institutional Research and Planning Department were in a spreadsheet that I cleaned (see Ruel et al., 2016, Chapter 13) to ensure valid values prior to being entered into SPSS for analysis. The deidentified data were divided into four groups comprised of the three linked sections for developmental students and one nonlinked section for the nondevelopmental college-ready students. The data for these four groups were compared to address the RQ.

RQ: What are the differences, if any, in the proportions of students passing the interdisciplinary science course among developmental 1st-year students in the three linked course block schedules and 1st-year students not in the linked course block schedules?

H_0: There is no statistically significant difference in the proportions of students passing the interdisciplinary science course among developmental 1st-year students in the three linked course block schedules and 1st-year students not in the linked course block schedules.

H_1: There is a statistically significant difference in the proportions of students passing the interdisciplinary science course among developmental 1st-year students in the three linked course block schedules and 1st-year students not in the linked course block schedules.

The chi-square test for independent samples (see Huck, 2012) followed by post hoc tests for two proportions (see Huck, 2012; Laerd Statistics, 2016) in SPSS were used to determine if there were any significant differences among the proportions of students passing the interdisciplinary science course based on their enrollment in one of the three developmental block schedules and nondevelopmental students not in block schedules, as well as if there were significant differences among the three developmental block schedule groups. No correction for the use of multiple post hoc tests was made because of the relatively small number of comparisons and the controversy surrounding these procedures as being overly conservative (see Perneger, 1998).

Assumptions for use of the chi-square test for independent samples (see Huck, 2012) were met with the independent variable (instructional group) being categorical

with three or more independent groups and the dependent variable (grades) being dichotomous, independence of observations (group membership), and all expected cell counts of at least five.

Threats to Validity

Internal validity is the ability to rule out, or make unlikely, any results of a study beyond the influence of an independent variable (Huck, 2012), whereas external validity is the ability to generalize the results of a study. Validity may be affected by the following issues. Testing reactivity is the subject's awareness of the variable, such as might be caused by a pretest (Ohlund & Yu, n.d.). Students in the science course took tests after segments of information were taught. The final exam was paper and pencil, and students were expected to have knowledge of the content to be assessed if they attended classes. All groups of students were in the same general education science class and received the same instruction and assessments. Interactive effects of selection bias and experimental variables were not a threat to this study because selection of participants included all students registered for the required general education science course.

Reactive effects of experimental arrangements occur when the results are difficult to generalize to nonexperimental settings (Ohlund & Yu, n.d.). This research was based on a retrospective analysis of data produced through the normal activities in the courses, not an experimental manipulation. The outcomes of this research, therefore, should be able to be generalized to other similar academic courses and institutions of higher education.

Multiple-treatment interference is when the same persons receive several treatments and it is difficult to control for the effects of prior treatments (Ohlund & Yu, n.d.). The students in block schedules received the same science instruction as the students not in block schedules. The college-ready students were not in block schedules and did not receive additional academic instruction. However, the students in block schedules received additional assistance in understanding the science course content through the reading and/or writing block schedules. Block-scheduled students received additional treatments of developmental instruction in reading, writing, or combined reading and writing that were parallel to and coordinated with the science course. The effect of the latter combined reading and writing instruction was compared to its components.

Internal validity refers to whether a treatment or condition makes a difference to the study, or not, and whether there is sufficient evidence to support the claim (Huck, 2012). History is when specific events occur between the first and second measurement of outcomes (Ohlund & Yu, n.d.). In this study, there may have been specific events, such as tests and quizzes, in addition to the final exam for the science course; however, all students would have been exposed to these events. The dependent variable or outcome for the study was measured only once; the final cumulative grade is the measurement for passing or failing the science course.

Maturation is when participants in a study act as a function of the passage of time regardless of treatment (Ohlund & Yu, n.d.). Maturation may have been a factor for all

the students. The course was one semester, 16 weeks, and students may have realized the significance of partaking in the activities of the course due to their immediate grades. All participants were 1st-year students and were approximately the same age.

Testing is a threat to validity when taking a test affects the result of taking a second test (Ohlund & Yu, n.d.). All students in the study had the opportunity to take all the required assessments for the required course. Instrumentation is when changes in testing or other factors produce changes in outcomes (Ohlund & Yu, n.d.). All students received the same assessments throughout the course to culminate in a final grade for the course. All respective assessments were the same weight for each task. Statistical regression may occur when the selection of participants is based on extreme scores or characteristics (Ohlund & Yu, n.d.). The selection of students for the study was based on registration for the science course during the fall semester of defined years. There was no extreme selection of scores or characteristics of participants that would create biased sampling. Developmental groups were created based on entrance testing scores that identified the need for developmental services. The comparison group, nondevelopmental students enrolled in the same science course, included students who were college ready.

Experimental mortality is the loss of participants (Ohlund & Yu, n.d.). Only the final grade for the required general education science course was measured. If the students completed the course, there was a final grade. If a student had not completed the course and had withdrawn instead of receiving a grade, the student was not included in the study. Experimental mortality was not a concern because student withdrawal rates

were within the normal range for 1st-year courses. Withdrawal rates from the reading (2.8%) and writing (2.1%) developmental courses were below those of the college-ready nondevelopmental students (3.2%); students in the reading and writing course (4.5%) withdrew at a higher rate, possibly related to the lower pass rate in science.

Selection-maturation interaction is when comparison groups and maturation interact and may lead to incorrect conclusions (Ohlund & Yu, n.d.). There was no additional comparison group for this study that was not exposed to the course; the study included only students who were in the same general education science course.

Construct validity is whether the measuring instrument measures what is intended (Huck, 2012). The dependent measure for the study was the final grade in the science course based on the instructional materials and exams in the course, which were developed by the instructors and should reflect construct validity. Statistical conclusion validity should be ensured by an adequate sample size and meeting the assumptions required for the use of the appropriate statistical tests.

Ethical Procedures

Approval to conduct my study required institutional permission from the IRBs at both the University serving as the research site and Walden University. Because archival data were used, there was no direct contact with or recruitment of participants. Archival data were retrieved by the University Institutional Research and Planning Department for students who were registered for the required general education science course and were placed into learning communities based on institutional requirements. Students who

completed the course received final grades identifying passing or failing performance. I had no conflict of interest or special incentives to conduct this study.

Archival data were received from the University Institutional Research and Planning Department. Data were deidentified and coded by that department to ensure anonymity of the students. Data will be housed in a locked file cabinet in my office as well as code protected on my computer. No one other than myself and my doctoral committee members will have access to the data. Per Walden University guidelines, the data will be maintained for a period of 5 years and then destroyed.

Summary

In this research, I compared pass rates of 1st-year developmental students in block schedule learning communities and nondevelopmental college-ready students not in block schedule learning communities for the required general education science course. Archival data were used in this quantitative study. Learning community block schedules with reading and/or writing classes were used to assist developmental students with science course content. A causal comparative design was used with archived student data provided by the University Institutional Research and Planning Department. All archived data were deidentified prior to receipt. Approvals were obtained from the IRBs at Walden University and the University. Chapter 4 will include an introduction, description of data collection, results, and a chapter summary.

Chapter 4: Results

The purpose of this quantitative study was to determine whether linked academic skill-development courses were associated with academic success, as indicated by comparing pass rates in a required college-level course for students enrolled, or not enrolled, in interdisciplinary linked block schedules. The RQ and hypotheses tested were as follows:

RQ: What are the differences, if any, in the proportions of students passing the interdisciplinary science course among developmental 1st-year students in the three linked course block schedules and 1st-year students not in the linked course block schedules?

H_0: There is no statistically significant difference in the proportions of students passing the interdisciplinary science course among developmental 1st-year students in the three linked course block schedules and 1st-year students not in the linked course block schedules.

H_1: There is a statistically significant difference in the proportions of students passing the interdisciplinary science course among developmental 1st-year students in the three linked course block schedules and 1st-year students not in the linked course block schedules.

This chapter includes a discussion of the archival data retrieval process and procedures, assumptions and results of the initial and post hoc statistical tests, and a summary.

Data Collection

The census sample for this study included all students on the two campuses of the University who were enrolled in the interdisciplinary required 1st-year general education science course for the fall semesters of 2008, 2009, 2010, 2011, and 2012. The students were also registered in the reading and/or writing developmental education skill courses, or if they met the institutional placement criteria for reading and writing, the college-level English course.

I retrieved the deidentified student data from the research site after receiving the University's IRB approval and that of Walden University. Data were obtained for 645 students across fall semesters 2008 through 2012. To meet the needs of the study, letter grades (A, B, C, D) were converted to passing (P) or failing (F). Data were deleted from the sample if grades were missing or were other than letter grades, such as incomplete or withdrawn, leaving data for 505 students in the final dataset. Table 1 indicates the distribution of students by year in the data originally received and after cleaning.

Table 1

Distribution of Data by Year in Original and Final Datasets

Year	Original dataset		Cleaned		Final dataset	
	N	%	*N*	%	*N*	%
2008	124	24.0%	7	27.1%	117	23.2%
2009	106	18.1%	11	15.7%	95	18.8%
2010	107	20.5%	7	22.9%	100	19.8%
2011	100	19.4%	4	20.7%	96	19.0%
2012	103	18.0%	6	13.6%	97	19.2%
Total	540	100%	35	100%	505	100%

Intervention Fidelity

Fidelity of the intervention was needed to ensure that implementation of the program studied in this research did not deviate from the intended plan for students over the 5-year timeline. Throughout the fall semesters of 2008–2012, the interdisciplinary general education science course was staffed by the same two professors who team taught the course. All students who were registered for the lecture-based course received the same lecture content, materials, tests, projects, research paper criteria, and the opportunity to participate in a weekly community natural-science-oriented lab. The developmental and nondevelopmental students were grouped together in the lectures. The course syllabus, passing-grade criteria, and content were uniform and consistent each semester.

Results

The data received from the University in spreadsheet format were uploaded into SPSS Version 27, which was used to analyze the data. The statistical test selected was the chi-square test for independent samples because the data consisted of two categorical variables.

Assumptions of the Statistical Test

The chi-square test for independent samples requires four assumptions to be met (Huck, 2012; Laerd Statistics, 2016):

1. The study includes two nominal or ordinal variables, each with two or more categories, which for this study were grades in the science course (passing and failing) and instructional groups of students (three groups of developmental English and one group of nondevelopmental English).
2. The study must use independent observations; for this study, the students were enrolled in different courses.
3. The data were collected using cross-sectional sampling. For this study, repeated cross-sectional sampling over time was used, for which retrospective census sampling was conducted to identify different students enrolled in the same science course at five different points in time, the successive fall semesters from 2008 to 2012.
4. The last assumption is that the sample size is adequate; fewer than 20% of cells in the chi-square have expected frequencies of 5 or less, and no cells

have expected frequencies less than 1. The sample size met this assumption and was adequate for the analysis.

Chi-Square Test Results

The chi-square test for independent samples is used to identify statistically significant differences in probabilities between two independent categorical variables (see Huck, 2012). In this study, the first (independent) variable was four student groups, three developmental and one nondevelopmental. The second (dependent) variable was grades in the general education science course, pass or fail. The chi-square was significant, $\chi^2(3) = 19.481$, $p < .001$, with an estimated effect size of small to medium (see Laerd Statistics, 2016), Cramer's V = .196; the null hypothesis was rejected. These statistical results indicated significant differences among the instructional groups in the proportions of passing and failing grades in the science course. Because passing and failing were complementary, the discussion reflects passing grades, the variable of interest in this study. The observed, expected, and residual values are shown in Table 2.

Table 2

Observed Values, Expected Values, and Adjusted Residuals

Group	Passed observed (expected)	Failed observed (expected)	Total	Adjusted residual
Reading	123 (127)	48 (44)	171	.9
Writing	33 (34.2)	13 (11.8)	46	.4
Reading & writing	66 (79.5)	41 (27.5)	107	3.4
Nondevelopmental	153 (134.4)	28 (46.6)	181	3.9
Total	375	130	505	--

To determine which groups differed, six post hoc pairwise comparisons were conducted using the test for two proportions, also called the chi-square test of homogeneity (see Laerd Statistics, 2016). The results of these analyses are summarized in Table 3, which also indicates the largest effect size, reflected by Cramer's V, for the comparison of the nondevelopmental and combined reading and writing group. The pass rates of the reading, writing, and combined reading and writing groups were significantly lower than that of the nondevelopmental group. Pass rates of the three developmental groups (reading, writing, and combined reading and writing) did not differ significantly from each other.

Table 3

Results of Six Post Hoc Pairwise Comparison Tests for Two Proportions

Groups compared	χ^2	*df*	*p*	Cramer's V
Nondevelopmental				
Reading	8.247	1	.004*	.153
Writing	4.055	1	.044	.134
Reading & writing	19.269	1	< .001*	.259
Reading & writing				
Reading	3.176	1	.075	.107
Writing	1.425	1	.233	.096
Reading				
Writing	.001	1	.980	.002

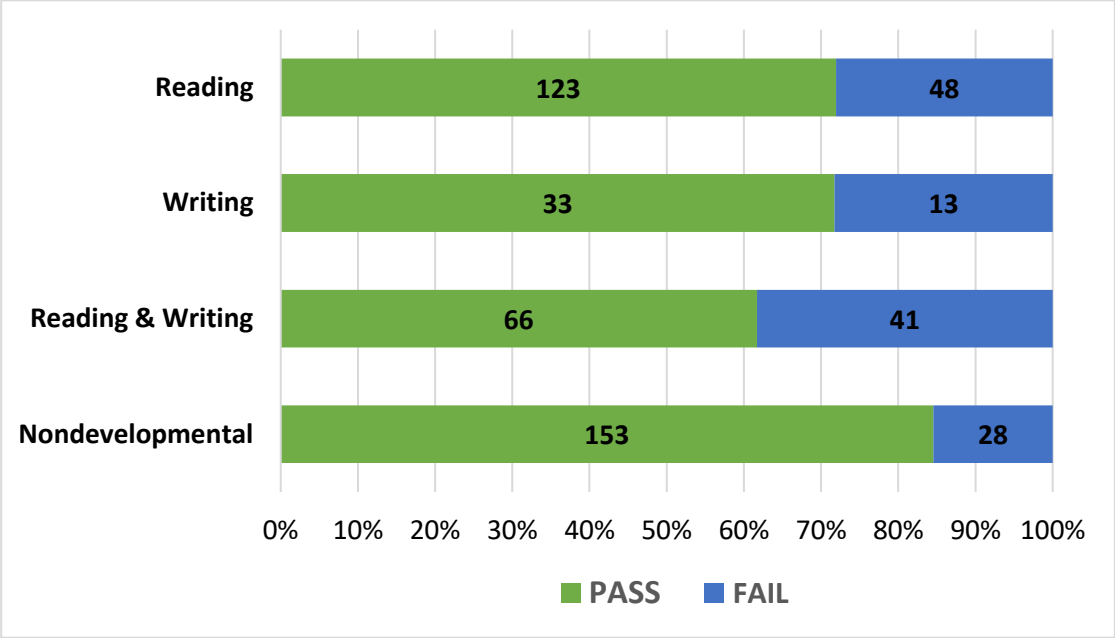
*$p < .05$.

With respect to the passing rates for each of the groups, the nondevelopmental science passing rate was approximately 85% and the total developmental science passing

rate was approximately 68%. For the three developmental groups, the passing rates were approximately 73% for reading, 73% for writing, and 62% for the combined reading and writing group. These percentages and corresponding frequencies are shown in Figure 1.

Figure 1

Frequencies and Percentages of Passing and Failing Grades by Groups



Summary

After I cleaned the archival data comprising final grades in the general education science course for fall semesters 2008–2012, the sample included data for 505 students. The chi-square test for independent samples was used to determine if there were differences in the proportions of students passing the interdisciplinary science course among developmental 1st-year students in the three linked block schedule courses and

1st-year students not in the linked block schedule courses. The significant chi-square indicated that pass rates of the three developmental groups—reading, writing, and the combined reading and writing group—were significantly lower than the pass rate of the nondevelopmental group, although pass rates of the developmental groups were not significantly different from each other. Chapter 5 will include the interpretations of the findings, limitations of the study, and conclusions. Implications of the findings for practice and research, as well as recommendations will also be discussed.

Chapter 5: Discussion, Conclusion, and Recommendations

The purpose of this quantitative study was to determine whether linked academic skill-development courses in a program for 1st-year students were associated with academic success, as indicated by comparing pass rates in a required college-level course for students enrolled, or not enrolled, in interdisciplinary linked block schedules. The archival data retrieved for the study included all students enrolled in the general education science course during the fall semesters 2008, 2009, 2010, 2011, and 2012. The final grades of students in the science course were used to determine the pass rates of the four instructional groups in the study, the three groups with developmental support of block schedules—science with reading, science with writing, science with combined reading and writing—as well as a college-ready, nondevelopmental group taking the science course without developmental reading and/or writing support. The chi-square test for independent samples indicated that the science pass rates of the three developmental groups were significantly lower than the pass rate of the nondevelopmental group but that they did not differ significantly from each other.

Interpretation of the Findings

Programs incorporating learning communities for 1st-year developmental students have tracked course completion (Nix et al., 2020), retention and persistence rates, and persistence to graduation timelines (Complete College America, 2022; Diener et al., 2021) as measures of developmental students' success. In general, learning communities

were found to have positive outcomes for developmental students' course grades and longer term measures of success such as retention and graduation rates.

The University implemented a 1st-year studies program incorporating several of the same components used by other institutions attempting to assist their 1st-year developmental students to acclimate to the rigors of college. Several institutions of higher education reported inclusion of corequisite, or paired, courses and learning communities that were beneficial to 1st-year developmental college students who arrived underprepared and at-risk for college success (see Diener et al., 2021; Virtue et al., 2019). The states of Colorado and Florida created developmental education that used corequisite courses for underprepared 1st-year students (Nix et al., 2020). Nonprofit organizations such as Achieving the Dream (2022a) and Complete College America (2022) assist developmental college students to attain passing grades through student involvement and integration.

The University used similar means, paired courses within learning communities, to facilitate developmental students' success in a required interdisciplinary college-level science course. In this study, the developmental students in the reading group and writing group had the same approximate pass rates. However, the combined reading and writing group had a lower pass rate than the both the reading group and writing group. One hypothesis to explain this is that because the students in the combined group were the least prepared for college, requiring remediation in both reading and writing, they could not sustain the rigor of both reading and writing instruction with the demands of the

general education science course. Although this research indicated that students in the University's 1st-year linked corequisite courses within learning communities did not meet the same pass rate as the nondevelopmental college-ready students for the science course, on average across the developmental courses, two thirds of these students did pass the science course. According to the science course professor in 2008, reading and writing were apparent deficiencies in the content area.

These developmental education practices are supported by theories such as Tinto's (2017b) integration theory, which postulates that developmental students who become involved in college activities and classes develop a sense of belonging, which can facilitate college success. Learning communities are designed for developmental students to interact with each other as well as with the course content, facilitating both the academic and social student interactions, which create a stronger sense of belonging and motivation (Tinto, 2017b). Corequisite courses are often part of the academic structure for 1st-year students in learning communities, as they were at the University. The interactions of the developmental academic corequisite course content with regular college courses encourage developmental students to transfer the information from one academic setting to another, strengthening learning in both areas.

Limitations of the Study

Limitations of this study include that the study was conducted at the two campuses of only one institution. Of the retrieved data for 540 developmental and nondevelopmental students enrolled in the science course (see Table 1), 35 students' data

(6.4%) were deleted due to missing grades (18, 3.3%) or withdrawing from a course (17, 3.1%). As previously noted with respect to experimental mortality, students in the reading and writing course withdrew at a slightly higher rate (4.5%) than other groups, possibly related to the lower pass rate in science. These deletions from the data and course withdrawal rates are within reasonable expectations and should not affect generalizability. Thus, the outcomes of this study may be generalizable to other 2- and 4-year institutions of higher education that have developmental students or plan to initiate or modify an existing 1st-year curriculum or program.

Recommendations

Additional similar studies could be conducted comparing pass rates of developmental and nondevelopmental students in other 1st-year interdisciplinary courses in learning communities at the University. Alternately, a survey of students who are, or were, in the learning communities during their 1st year at the University could be conducted to determine if students believe the block scheduling is meeting their academic needs as 1st-year students.

Implications

The results of this study provide a guide to begin a review of the 1st-year students' academic and social integration, as well as success in college-level courses at the University. This may entail discussions among 1st-year faculty and possible committee formation for review of services and curricula for 1st-year students. This initiative could begin to identify instructional components that can be immediately implemented and can

create plans for long-term development in the 1st-year activities and curricula. This will further development of students' academic skill sets, preparation for college-ready courses, and inclusion in University activities. The focus on improving inclusiveness for 1st-year students may increase passing grades that can lead to retention, persistence, and graduation. Academic student success drives student motivation, self-worth, and inclusiveness; and block scheduling in learning communities can be an integral part of developmental student success.

Conclusion

Social change happens gradually. With the advancement of each class, students can earn passing grades and increase interaction in academic and social activities, which leads to further active participation in the University community. When students persist and graduate from higher education, they contribute to their families and communities. They believe in their ability to have a positive influence on society regardless of profession. These positive steps begin with recognizing struggling 1st-year students, especially developmental students.

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