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Leading them to water: A study of the efficacy of a Mandatory Placement Project in first-year academic courses at a community college

Janet Elizabeth Emmerson
Iowa State University

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**Leading them to water: A study of the efficacy of a Mandatory Placement Project in
first-year academic courses at a community college**

by

Janet Elizabeth Emmerson

A dissertation submitted to the graduate faculty

In partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

Major: Education (Educational Leadership)

Program of Study Committee:
Larry H. Ebbers, Major Professor
Virginia C. Arthur
Daniel C. Robinson
Mack C. Shelley II
Margaret C. Torrie

Iowa State University

Ames, Iowa

2009

DEDICATION

To my husband

Robert,

and my children:

Zachary, Graham, and Hannah;

From the bottom of my heart,

Thank you!

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ABSTRACT

Student retention is a topic at the forefront for all post secondary education institutions. Supporting students in their studies, providing the resources to empower them to complete their education is a critical component in the quality and success of colleges. It is also a fiscal concern for colleges. While first year programs abound, community colleges are faced with the challenges of a largely commuter population with very diverse backgrounds. Community colleges are also by mission, open access institutions.

This quantitative research study looked at a mandatory placement project piloted at a central Iowa community college in 2006 and 2007. It focused on an analysis of the first year program options provided at the college and the effectiveness of intensive, directed advisement of students to participate in one or more of the options in relation to enhanced persistence from fall to spring.

Six different academic course environments were studied: a traditional first year seminar course focused on acclimating students to college; a course focused on skills necessary for successful postsecondary studies; learning communities, educational constructs of collaborative courses sharing a single community of learners; and developmental courses in reading, writing and math, designed to prepare students for the rigors of college level instruction. The study looked at the makeup of the students who participated in each of the environments and the appeal to different demographic groups of students in reference to age categories, gender, race, first generation students and low income students. The study then focused on the outcomes of term GPA and credits retained in effectiveness of the project on student persistence from fall to spring.

Findings of the study revealed that participation in learning communities had a significant effect on persistence from fall to spring. Other significant contributing factors that enhanced persistence were the retention of credits during the term and term GPA. While not analyzed for statistical significance in this research study, additional findings indicated that students in the project retained credits at a much higher rate than a similar group of students who were not in the project. The same findings were found when looking at students who participated in at least one of the environments over students who did not participate in any of the environments.

CHAPTER 1.

INTRODUCTION

Background of the Study

With increasing globalization, technology and outsourcing of lower skilled jobs education beyond K-12 is becoming increasingly important to America's workforce and economy (ACT, 2003). To meet these economic needs colleges, universities, community colleges and for-profit institutions offer a diverse scope of educational opportunities both in the areas of liberal arts and sciences as well as career and technical training. In addition, while many students enter postsecondary education each year with various hopes and aspirations, retaining them to achieve their academic goals presents a critical challenge to institutions. In 1995-96 the national retention of undergraduates entering four-year institutions was 55% over a six-year span (Lotkowski, Robbins, & Noeth, 2004). To meet the needs of students and facilitate their educational pursuits the focus on student retention is a primary area of concern to institutions in providing quality educational services, (Barefoot, 2004; Lotkowski et al., 2004; Tinto, 1993). With federal attention on educational funding, in 2005, Secretary of Education Margaret Spellings appointed a national committee of education and business experts to conduct discussions on issues of accountability and quality in higher education. Measuring student retention is among the topics covered in the arena of accreditation and funding (U.S. Department of Education, *A test of leadership: Charting the future of U.S. higher education*, 2006).

The study and design of programs that are effective in supporting students has been at the forefront of researchers for over 30 years. Tinto (1975, 1993) a pioneer in the field of

student retention, has conducted extensive research on the issue of student attrition. Since 1983 the American College Testing, ACT, has published the *ACT National Dropout and Degree Completion Tables*. The most recent report indicates that retention from the first-year to the second for students enrolled at public four-year baccalaureate institutions in 1983-2006 ranged from a low of 66.4% in 1996 and 2005 to a high of 70.0% in 2004. In 2006, student retention was 69.9%. For community colleges student retention from year one to year two has declined from a high of 53.1% in 1983 to low of 51.3% in 2004. The most current report for 2006 indicated that two-year public institutions demonstrated a small increase (52.5%). While retention in community colleges appears to be turning the tide and increasing again, it is still disturbing to note that this rate is significantly lower than four-year institutions. Gardner (2005) and colleagues from the Policy Center on the First-year of College at Brevard, North Carolina in collaboration with the University of South Carolina's National Resource Center for the First-Year Experience and Students in Transition have pioneered a national focus on student engagement practices in the first-year of college. More recently, Kuh (2005) and colleagues from the Center for Postsecondary Research at Indiana University conducted the Documenting Effective Education Practice (DEEP) project which studies effective practices of colleges and universities in the area of student persistence.

In order to support students and eliminate obstacles, virtually all postsecondary institutions have developed and individualized frameworks of student support in the areas of academic advising, financial aid, and social constructs for students. In addition, many colleges have created special orientation programs, implemented early warning tracking systems and instituted curricular innovations in their credit programs with developmental support for freshman gateway courses such as composition, math and reading. All of these

efforts provide for varying measures of success for students and all are important facets in developing a comprehensive support system for student persistence.

However, much of the literature focuses on institutional retention practices and research targeting traditional aged students ages 18-24 attending residential four-year colleges. Examples are residential dormitory experience programs, living learning communities for new students within programs of study or specific residential halls, campus organizations, first-year experience seminars, collegiate activities and sports all of which support the development of ownership and community. While retention initiatives abound and multiple studies have been conducted to assess the benefits of those programs, the effectiveness of the practices becomes more problematic when transferring those models to the community college setting.

Statement of the Problem

Community colleges by their nature are structured as two-year institutions serving both traditional and non-traditional student populations and are based in their local communities. The community college student base is broad, diverse and for the most part a commuter population. Community college students are frequently challenged to blend their academic pursuits with work and/or family obligations. Time on campus becomes fragmented and brief. Campus residences are often not available or limited in scope. Retention interventions based on the traditional college experience do not readily adapt.

The literature supports the benefits of retaining students. Students that persist in their academic goals experience personal success, become better equipped to manage their future and become productive contributors and members of society (Community College Survey of

Student Engagement, 2004; Habley, 2004; Twigg, 2005). The mission of community colleges is to be an academic resource for the community; to provide accessible postsecondary education and skills training that support the needs of the community in which the college is based. A revolving door of students either stopping or dropping out is problematic in achieving that mission. If colleges are not successful in engaging students in the areas of academic participation and connectedness, and supporting them on their personal road to success, they are not fulfilling their chartered mission of supporting their communities. In addition to concerns about fulfilling their chartered mission, student retention is a fiscally beneficial consideration for colleges (Cuso, 2007; Epperson, 2000; Hossler & Anderson, 2005; Shelley & Epperson, 2007). The issue of how best to foster engagement in a diverse population of students and provide support in their persistence to successful completion opens the door to the discussion of academic preparedness - specifically required first-year course options and mandatory placement.

Much of the current literature on mandatory placement focuses on the remedial aspect of academic preparation and is limited in scope. While research exists on the efficacy of supported first-year courses, there is limited research available on mandatory placement in multi-optioned freshman gateway offerings such as developmental courses, first-year seminars, and first-year learning community offerings. Although there are validating studies that demonstrate that students who participate in supported or developmental courses determined by pre-entrance assessment testing do better in subsequent coursework (Barefoot et al., 2005; Hadden, 2000), there is a school of thought that higher education institutions should provide *advisory* placement services only.

The commonly accepted definition of mandatory placement of students in remedial coursework becomes a delicate proposition in community colleges due to the college mission of open access. Issues of equity in regards to stigmatization, discrimination and diversity, as well as defeating students before they begin are strong concerns. The phrase “allowing students the right to fail” is prominent in all policy discussions about mandatory placement (Hadden, 2000). It is a controversial issue in community colleges when structuring assessment and course placement policies. The issue of mandatorily directing students into supported coursework that seemingly requires a step back, extra expense and has no credit transferability is controversial. Arguments that self-placement or self-selection promotes the development of responsibility proliferate (Hadden, 2000; Zeitlen & Markus, 1996). In contrast to that advisory and passive support approach for students, Rendón (1993) was persuasive in her premise that non-traditional, at-risk students who are not aggressively supported in their academic endeavors do not have the internal resources or social capital necessary to persist. Students who have not have access to traditional family mentoring support for postsecondary education are more in need of support in academic planning and course preparedness (Community College Survey of Student Engagement, 2004; Mechur Karp, O’Gara, & Hughs, 2008).

When designing a gateway experience for new students that would support an institution’s ability to retain students one also has to look beyond developmental support and address instructional delivery and first-year seminars. The literature on learning communities provides strong evidence that student engagement is enhanced through the creation of connectivity to peers and faculty as is the ability to develop a deeper level of learning through the connection of coursework and interaction and discourse of two separate

instructors (Barefoot et al., 2005; Habley, 2004; O'Banion, 1997; Tinto, 2000). Much information exists on the value of first-year seminars, which acquaint students with the college environment and provide study strategies and mentoring or advising support (Barefoot et al., 2005; Heinscheid, 2004).

Des Moines Area Community College (DMACC) is a six campus, two-year College based in central Iowa. Over the years the College has developed multiple academic support structures to assist students in successful achievement of their academic goals. The College offers courses that support students in orienting to the college environment, improving their study skills, developmental skill building in the areas of reading, writing and math, and the shared cohort experiences of learning communities. Prior to a project study by Emmerson (2008) to develop a data-driven descriptive investigation of a sample of the DMACC first-year support offerings there had been no dedicated research conducted to study the efficacy of the structures. More recently the College has focused on student retention relative to its mission, quality of services provided and economic viability (Hossler & Anderson, 2005).

In 2004, upon the inception of a 5-year Title III Strengthening Institutions Grant, the Office of Institutional Effectiveness at DMACC conducted extensive studies of student demographics and identified that within the institution, students who registered late were the most at-risk for low grades, course retention, and persistence into the following term, (Des Moines Area Community College, 2004). In the fall of 2006, DMACC actively addressed the issue of student retention by instituting a study labeled a Mandatory Placement Project for a focused pool of first-time, full-time, late registering students on its Ankeny campus. While there was institutional research to identify input factors of late registering students of the

College there has been no statistical analysis conducted on the efficacy of directing these students to participate in the Mandatory Placement Project.

The Mandatory Placement Project was designed using the support course options already in place at the College. Historically, these courses have been offered as voluntary enrollment options with limited or no recommendations for many years. For the purposes of this project no changes were made to the course contents or offerings other than to expand the availability of Learning Communities. In addition to the courses, once students registered for their courses an administrative hold was placed on the students' records which required each student to meet with an advisor if and when modifying schedules or re-enrolling for the following semester. The project provided for intensive advisement of identified students to register for at least one of six supported academic options. The options provided were:

1. The College Experience
2. Study Strategies
3. Learning Communities
4. College Preparatory Reading (College Prep Reading)
5. College Preparatory Writing (College Prep Writing)
6. College Preparatory Math (College Prep Math)

Purpose of the Study

The over arching purpose of this study was to provide a quantitative research based analysis regarding the efficacy of the Mandatory Placement Project of identified full-time late registering students enrolling in DMACC for the first time. More specifically, each identified first-year environment provided in the project was studied in order to provide

insight into the effectiveness and validity of mandatorily placing students into these directed environments. The analysis included descriptive statistics of the environments as well as the outputs of credit retention, fall-spring persistence and grades. The over-arching questions studied were:

1. Do any of the input demographic factors of race, gender, age, first generation Pell grant status, participation, and pilot or control have an effect on the fall-spring persistence of late registrants?
2. Does participation in any of the first semester college course environments by late registrants have an effect on fall-spring persistence for late registrants?
3. Do any of the output performance characteristics have an effect on fall-spring persistence for late registrants?

The units of analyses for the study encompassed two samples. The first sample was comprised of new, full-time, late registering students at the DMACC Ankeny campus, who were intensively advised to enroll in identified first-year course options: The College Experience, Study Strategies, Learning Communities and College Prep courses in Reading, Writing and Math during the fall semesters of 2006 and 2007. Through analysis of college data by the DMACC Office of Institutional Effectiveness, late registrants, enrolling in classes in the two weeks prior to semester start were identified as at a high risk of stopping or dropping out of the college after the first semester. Comparative analytics were conducted using a control sample of identified late registering full-time students enrolling for classes during the first week of classes at Ankeny campus. This control sample of students met the same risk parameters of the identified pilot sample; however due to the logistics of classes starting they were not required to enroll in any of the supported course options, nor were they

required to meet with an advisor prior to modifying schedules or re-enrolling for the subsequent semester. Quantitative data provided by the College banner system was used for the analysis.

This study focused on the directed enrollment and participation in each of the supported course options: The College Experience, Study Strategies, Learning Communities and College Preparatory courses in Reading, Writing and Math. Tinto's (1975) initial student attrition theory on how students who are not engaged in the college environment will leave and his ensuing retention model focusing on social and academic integration as well as Bean and Eaton's (2000) expansion of Tinto's theory with their model of motivation theory guided the study. According to Tinto (1993), student retention is a three-stage process of social and academic integration. The stages that students go through are separation, transition and incorporation. Bean and Eaton used psychological theories of attitude, coping, self-efficacy and attribution (locus of control) to provide a model of student motivation in relation to retention. Astin's (1993) model of input, environment and output was used as the guiding framework of the research.

The purpose of this research was to add to the body of knowledge about fall to spring persistence of students at DMACC through the implementation of a Mandatory Placement Project in first-year academic support course environments for the academic years 2006/2007 and 2007/2008. In the larger scope this research will add to the body of knowledge for best practices and further research on supporting community college students in the overall area of retention.

Theoretical Perspective

Several theoretical perspectives provided the underpinnings of this study. Tinto's (1975) interactionalist theoretical model, wherein lack of integration into the social and academic constructs of the college lead to low motivation to persist is a widely studied sociological theory focusing on the conceptualization of the drop out process. Basing his model on Durkheim's (1897, as cited in Tinto, 1975) psychological theory of suicide, Tinto developed it through the lens of educational economics. According to Tinto, students base their decision to persist at an institutional level. If they are not committed to the institution socially or academically they do not perceive a value in a cost benefit decision analysis. Tinto (2000) believed that learning communities by their nature of providing students with multi-focused opportunities to meet and develop relationships with a cohort of peers as well as develop deeper interactions with faculty on a regular basis through out the semester is supportive of integrating students into their environment. It supports the sense of belonging and ownership.

Bandura's (1977) psychological theory of self efficacy, in that confidence relative to one domain should be generalizable to some degree in another domain, provides another layer of depth in the decisions that students make to persist or not. While this theory is long standing, it continues to be relevant in studying the problem of student attrition and retention issues. As part of a comprehensive analysis of the Mandatory Placement Project it was incumbent for the researcher to consider Bandura's theory of self efficacy when studying the College Prep course environments and outputs of grades and credit retention.

The course options provided in the DMACC Mandatory Placement Project supported students in orienting to available college resources, expectations and environment. They

introduced strategies for successful study at the level of postsecondary coursework and provided linked classes for developing a sense of community. In addition, the project addressed the academic preparedness of students by providing developmental options in the areas of reading, writing and math as determined by college assessment testing. The premise was that if students felt empowered to strategize and succeed in their coursework, became familiar with expectations and resources, and/or developed meaningful relationships, they would develop a confidence that would sustain them in pursuing their academic goals.

Bean and Eaton (2000) employed a combination of four psychological theories: attitude and behavior, self-efficacy, coping behavior and attribution relative to student attrition and synthesized them into a heuristic psychological model of student retention. Their key assumption was that “leaving college is a behavior” (p. 49). They created a theoretical process linking institutional fit with intent to leave and persistence.

As a researcher focused on student retention and potential programming support mechanisms for community colleges, it was important to identify the factors that would potentially be predictive of student success in persisting towards their academic goals. Astin’s (1993) Input-Environment-Output (I-E-O) model provided the framework to organize and study the data. This model of analysis provided a comprehensive picture of the demographic input variables, the academic environment resources offered in the project, and the outputs of performance characteristics. It was a critical aspect of the study for the College to identify the variables and establish a comprehensive and research based policy for supporting first-year students at the College.

Research Questions

Quantitative research methodologies of both descriptive and inferential statistics were employed by the researcher in conducting the analyses. The input variables used for this study were the demographic factors of race, gender, age categories, first generation college student and Pell grant status, participation and pilot or control (Appendix A). The variables of the College Experience, Study Strategies, Learning Communities, College Prep Reading, College Prep Writing and College Prep Math were studied for environment analyses (Appendix B). The variables of 100% credit retention, fall to spring persistence, and term GPA of C or better were studied for outputs. The researcher selected 100% as the criteria for looking at students as that was the goal of the College. In addition, the term GPA of C or better was selected as that was the criteria for maintaining acceptable enrollment status in the college. In addition, the demographic variables of ACT/Compass scores, while not analyzed for predictability by the researcher, were reviewed to develop a picture of the studied sample.

Three research questions guided the study:

1. Do any of the demographic factors of race, gender, age, first generation Pell grant status, participation, and pilot or control have an effect on the fall-spring persistence of late registrants?

As the hypothesis of this study was based on the premise that there was an effect in the demographic input factors of the Mandatory Placement Project for late registrants and fall-spring persistence the null hypothesis was used to test the input variables:

NH1. None of the seven demographic input variables of Gender, Age categories, Race, First generation student status, Pell Grant recipient status, Participation or Sample Groups of pilot versus control have no effect on fall–spring persistence for late registrants.

2. Does participation in any of the first semester college course environments by late registrants have an effect on fall-spring persistence for late registrants?

As the academic environments provided by the College were the basis for the Mandatory Placement Project, the null hypothesis was developed to test for support of the question:

NH2. Participation in environment variables of the College Experience, Study Strategies, Learning Communities, College Prep Reading, College Prep Writing and or College Prep Math courses by late registrants has no effect on fall-spring persistence for late registrants.

To study this question in depth, the researcher focused analytics using descriptive statistics of frequencies and cross tabulations for each of the first-year course environments provided to students in the project study.

Finally the researcher conducted an analysis of two output performance variables for students in the project study:

3. Do any of the performance characteristics have an effect on fall-spring persistence for late registrants?

Again, as the hypothesis of this question was based on the premise that there was an effect between the output variables of course credit retention and term GPA for late registrants and fall-spring persistence the following question was used to test for the null hypotheses:

NH3. The output variables or performance characteristics of 100% Credit Retention or $\text{Term GPA} \geq C$ have no effect on fall-spring persistence for late registrants.

Significance of the Study

While research supports the effectiveness of first-year seminars, learning communities and developmental course work in supporting academic persistence, limited data have been provided on the effectiveness of directed participation in these options. The comprehensive statistical research of this project study provided insight into the value of instituting a directed academic experience in a community college setting and added to the body of knowledge on the efficacy of student retention initiatives in community colleges.

Delimitations and Limitations

This study was designed to determine if the Mandatory Placement Project conducted at DMACC was an effective intervention for student support in the area of persistence for late registering students. It was also intended to identify potential variables that would enhance students' likelihood of persistence. The project was conducted only on the Ankeny campus of the Des Moines Area Community College; a single campus out of the six campus district and the study findings could possibly not be applicable to all institution types. This study looked only at the first-year academic support course options of the College Experience, Study Strategies, Learning Communities and College Prep Reading, College Prep Writing and College Prep Math courses. This study covered a two-year window of time and did not look beyond the initial fall-spring enrollment for the subjects.

Definition of Terms

Although broadly used in education, several terms which have specific definitions for the purposes of this research are provided as follows:

ACT scores: American College Testing program provides a national assessment tool used to measure levels of educational development in the normal high school academic content areas of English, mathematics, reading and science. These scores are provided postsecondary institutions for multiple purposes. For the purpose of this paper, the scores are used for academic placement in college level coursework.

Age categories (Age Categories): To look at interest and applicability of the environments to students, the study was grouped into three categories: ≤ 24 years (traditional aged students), ages 25 to 35 years old (non-traditional aged students) and ≥ 36 years.

College Prep Reading (CPR), College Prep Writing (CPW) & College Prep Math (CPM) courses: Developmental courses commonly provided in the areas of reading, writing and mathematics. These courses are designed to prepare students to successfully handle the rigor of college-level courses that require a higher level of the basic academic skills. The use of the word “preparatory” is used by DMACC to articulate its developmental courses.

COMPASS assessment: Computer adapted placement assessment used by DMACC to measure proficiency levels in reading, writing and math. The assessment tool was developed by the American College of Testing, ACT. It is a placement recommendation tool used for full-time students enrolling at the College.

Control and Pilot Samples (Sample Groups): Control sample students for the study were full-time students enrolling for the first time at DMACC during the first week of classes. Pilot sample students for the study were full-time students enrolling at DMACC for the first time during the last two weeks prior to the semester starting. The students in these two samples all enrolled in the fall of 2006 or fall 2007 at the DMACC Ankeny campus.

Developmental education courses: Developmental education courses are commonly provided in the areas of reading, writing and mathematics. These courses are designed to prepare students to successfully handle the rigor of college-level courses that require a higher level of the basic academic skills. At DMACC the courses are formally titled College Preparatory Reading, College Preparatory Writing, and College Preparatory Math. In this study the researcher refers to the individual courses with the shortened titles of College Prep Reading, College Prep Writing, and College Prep Math.

Engagement: For the purposes of this research project the term engagement refers specifically to student connectedness to their academic environment, peers, faculty and educational goals.

Ethnicity: For federal reporting requirements DMACC collected race information on new students. The categories identified by the College were White, Black, Hispanic Asian, American Indian, and Unknown. There were 362 Whites, 16 Blacks, 20 Hispanics, 21 Asians, 3 American Indians and 22 Unknown in the study. As there were so few identified minorities, student race was grouped into two categories: White/Unknown and Minorities.

First generation college students (First Generation): First generation students in this study were self identified as being the first in their family history to attend a postsecondary educational institution.

Gender: There were 269 males, 173 females, and 2 respondents of unknown gender in the study.

Grade Point Average (Term GPA \geq C): Grade point average identifies the average GPA of students at the end of the fall term. The independent variable of Term GPA \geq C defines the benchmark term grade point average for students in the study. The level of C or above for

students in this study was selected as that is the term GPA that the College used for students to maintain good academic standing status.

Late Registering Students: The students selected for this study were identified by DMACC for meeting the following criteria. They were all first-time, full-time students who entered DMACC as late-registrants and took courses in a general liberal arts program of study. They met the criteria of late-registrant by enrolling in the College within two weeks prior to and during the first week of the fall semester start in 2006 and 2007. The Office of Institutional Effectiveness at DMACC conducted extensive studies of student demographics in 2004 and identified that within that institution, students who registered late were the most at-risk for low grades, low credit retention, and low persistence into the following term. There were no other qualifying demographic data used to identify late registering students.

Learning Community (LC) courses: An educational construct of collaborative courses sharing a single community of learners. Instructors may link their courses together, each teaching their course independently with collaborative instructional themes and or assignments, or instructors may collaboratively teach in both of the courses. In either method, students share a common enrollment in all courses taught in the Learning Community.

Mandatory Placement: The term mandatory placement is frequently understood as a required placement of students in developmental courses with the purpose of preparing them for the rigor of college level coursework. For the purposes of this research, mandatory placement was defined as directed enrollment of new students into one of six supportive educational options for offered at DMACC. The use of intrusive advising was employed at the time of course registration; however, after meeting with an advisor, students were allowed to sign a waiver and opt out of the directed participation within the offered environments. While

students were allowed to opt out of participation in any of the environments they were not allowed to opt out of meeting in person with an advisor for any schedule modifications and/or re-enrollment for the spring semester.

Participated (Participated): Students from both the pilot sample and the control sample participated in the studied environments of the Mandatory Placement Project. Of the 270 students in the pilot sample, 217 participated in at least one studied environment. Of the 174 students from the control sample, 60 participated in at least one studied environment.

Pell grant recipients (Pell Grant): DMACC has defined Pell grant recipients for this study as students who demonstrated low income status.

Percentage of Credits Retained (100% Crdts Retained): The independent variable of 100% Crdts Retained refers to the percentage of credit hours that students retained at the end of the term. For this study the threshold was set to 100% of the credits registered for at the beginning of the term were retained at the end of the term.

Persistence: While student persistence is frequently defined as fall-to-fall enrollment or graduation; for the purposes of this study, persistence was defined as student re-enrollment in a subsequent term, (Upcraft, Gardner, & Barefoot, 2005, p. 33). This study focused on fall to spring semester persistence.

Remedial courses: Developmental courses commonly provided in the areas of reading, writing, and mathematics. These courses are designed to prepare students to successfully handle the rigor of college-level courses that require a higher level of the basic academic skills. The use of the word “preparatory” is used by DMACC to articulate its developmental course offerings and College Preparatory Reading, College Preparatory Writing and College

Preparatory Math are the course titles. In this study the titles have been shortened to College Prep Reading, College Prep Writing and College Prep Math.

Retention: Broadly used retention is the term frequently used by educational institutions in discussions of supporting students to persist in their studies through the achievement of their academic goals. DMACC differentiates the term retention and defines it in the focus of course credit retention versus retention term-to-term. In this study course credit retention is the terminology used for credits retained and persistence is the reference for term-to-term.

Study Strategies (SS) course: This was a two credit hour course at DMACC that focused on the skills and strategies that support effective learning in a college setting.

The College Experience (TCE) course: The College Experience course offered at DMACC was a one credit hour course directed at providing students with an overview of college academic expectations and an introduction to the educational resources available to support learning. This course was similar to first year experience courses provided in many colleges across the country.

Summary

The need to retain students to the achievement of their postsecondary academic goals is increasingly critical in today's expanding global economy. Indeed, federal scrutiny is addressing measurable benchmarks for institutions in providing accreditation and financial assistance. While four-year baccalaureate colleges have developed different supportive resources for students in the area of academic developmental coursework, advising and counseling, the majority of the models and research focus on residential four-year institutions, traditional aged students and voluntary selection of available supportive services.

The challenges faced by community colleges with their non-traditional student base and commuter status don't allow for ready translation of the models or research implemented in the four-year institutions. This research project studied the efficacy of directed participation of an identified pool of late registering students in first-year academic support environment at Des Moines Area Community College.

CHAPTER 2.

LITERATURE REVIEW

Introduction

Student retention has been a much studied issue in postsecondary education for the past 30 years. While in the 1950s and 1960s student dropouts were viewed as an indicator of institutional elitism (Barefoot, 2004), the reverse is true today. Retaining students to successful completion of their academic pursuits has become a top priority for college administrators. It is not only a mark of quality in services provided; it is an economic issue for the operations of a college.

Student persistence from semester to semester and year to year is negatively affected by many known factors. Financial resource limitations, full-time work commitments, dependents, family demands, and limited academic preparedness are often cited as the reasons that hold students back from achieving their educational goals, (Community College Study of Student Engagement [CCSSE], 2005). It is interesting to note that, in a survey of institutions regarding student attrition published by American College Testing (Habley & McClanahan, 2004), three major reported student characteristics preventing successful completion of postsecondary education were inadequate preparation for college work, lack of motivation to succeed, and inadequate financial resources. These factors were followed by poor study skills, too many job demands, and too many family demands.

To offset these perceived obstacles colleges have instituted and refined services directed towards student support. Currently support is provided to students in the areas of academic advising, financial aid, and social construct opportunities for students.

College entry assessments like the ACT, SAT, COMPASS and other nationally recognized tools are used to identify academic preparedness and place students in appropriate courses. The results of these assessments, in conjunction with high school transcripts are a common tool used by colleges to both accept students into the institutions and advise or place them when registering for their first-year courses. These tools are useful for identifying students who might not have the academic preparedness necessary to successfully navigate postsecondary curriculum and are in need of remedial academic support. They do not provide with any consistency, the ability to predict student persistence towards completion of their academic goals. Student persistence is based on internal constructs that students bring with them in combination with the environment to which they are exposed as well as external mitigating factors (Tinto, 1975).

In looking at support for students beyond the initial college acceptance and appropriate instructional placement, many baccalaureate granting colleges and universities, as well as some two-year colleges provide residential environments for students. These residential environments provide a resource that supports the social needs of students and integrates them into the institutional community. While some two-year colleges do provide residential opportunities for their students, residence halls, apartments and fraternities and sororities are not as commonly available as at four-year colleges and universities.

Community colleges provide cost effective postsecondary educational services in localized geographic communities. By legislative mandate these community-based institutions support multiple educational opportunities for a broad base of students. The programming offered provides career and technical training in addition to traditional liberal arts education for students, who due to family circumstances or work commitments choose

not to attend a traditional baccalaureate granting college or university. As community colleges are located within the communities they serve, the need to provide a residential experience is limited.

With or without the residential component, all colleges create communities by providing multiple social and academic constructs to support student retention. These constructs may focus on additional social opportunities for interaction such as student organizations, student government, restaurants, community lounges, and fitness centers (Nathan, 2002) or provide for the identified needs of students in the areas of financial aid, academic advising, counseling, wellness centers, libraries, tutoring and technology resources. All are directed towards retention and supporting students in their persistence of their academic goals.

With student retention being a multi-faceted concern with no one specific resolution, colleges in addition, have created special orientation programs, implemented early warning tracking systems and instituted curricular innovations in their credit programs with developmental support for gateway courses. All of these efforts provide for varying measures of success and all are important facets in developing a comprehensive support system for student persistence. Still, student retention over the years has not improved significantly. Since 1983, the American College Testing ACT has published the *ACT National Dropout and Degree Completion Tables*. The most recent report indicates that retention from first-year to second for students enrolled at public four-year baccalaureate institutions from 1983-2006 ranged from a low of 66.4% in 1996 and 2005 to a high of 70.0% in 2004. In 2006, student retention was at 69.9%. For community colleges student retention from year one to year two declined from a high of 53.1% in 1983 to low of 51.3% in 2004. Reports indicated

that in 2006, two-year public institutions had a 52.5% retention rate. While retention in community colleges appears to be turning the tides and increasing again, it is still disturbing to note that this rate is significantly lower than four-year institutions.

Many of the support systems and services at higher education institutions were developed in response to identified barriers in the areas of poverty, race discrimination, limited family mentoring/support, race and English language skills, and limited academic preparedness; all factors that prevent students from persisting in their academic pursuits. Indeed, studies proliferate as to the external barriers that prevent students from persisting in their education (Barefoot, 2004, Jacoby & Garland, 2004, Pascarella et al., 2004, Tinto, 1975). These retention initiatives implemented by postsecondary institutions in the past twenty years fail to address students who do not need the supportive constructs of remedial assistance; don't take advantage of student advising and are not participating in any institutional financial aid resources.

While no individual retention initiative works for all students in all situations, institutional initiatives that focus on the social constructs and engagement resources, if successful, would be an essential component to student motivation and retention. The colloquialism holds true in education as well as in other aspects in life, "You can lead a horse to water, but you can't make it drink". A truly motivated student will find ways to overcome the financial, work, family and academic preparedness issues. The issue is how to motivate students. A motivated student is an engaged student. An engaged student feels like he or she is connected to the environment and is fully participating in the activities of the environment. His or her engagement is a critical support mechanism in maintaining that motivation. It is a circle of success.

Related Research

To some degree, a sense of connectivity can be facilitated more readily in colleges providing student residential housing. The construct of living in a dormitory creates a social community in which residents have multiple repeated opportunities to cross paths with each other and develop connections. That common living experience in and of itself becomes a social cohort experience. Opportunities to share experiences and develop common bonds to the institution are plentiful and, while some are structured by residence hall staff, many are loosely structured and created by the residents (Nathan, 2005).

That natural opportunity for shared experiences is lost to institutions not structured to primarily serve students in a residential situation. With the mission of community colleges to be local community-based educational resources, residential housing remains limited. Community colleges serve a broad range of constituency with diverse competing life responsibilities. Most of their student population commutes between college and home.

Johnson (1997) completed a study on retention addressing the different responsibilities and pressures and the needs of academic and social integration for commuter students. “A sense of community appears to be very important in the retention of students, regardless of their on-campus or off-campus residential status” (p. 323).

Although the community college student population is a mix of traditional age (18-24 years) and nontraditional age (25 and older) adult students, the highest population served are the nontraditional students who are often dealing with multiple external and competing roles and obligations (Johnson, 1997). In order to provide relevant and effective frameworks for this population to persist and succeed, it is important to make the social connectivity

available within an academic structure as community college students are not always free to make the college campus their social environment.

This is where the construct of learning communities comes into consideration. Much research has been conducted on the value of learning communities and their benefits for students. Learning communities are a proven and powerful multi-pronged resource for engaging students and providing support for the development of academic skills, professional, and social connections. Research by experts in the field has confirmed that “learning communities increase academic performance and persistence; help students bond to the broader social communities of the college and engage them more fully in the academic life of the institution” (O’Banion, 1997, p. 56). Linked courses with a common theme provide students with opportunities to interact with fellow classmates and establish networks, engage with faculty, and develop a deeper understanding of subject matter through integrated curriculum, (Upcraft, Gardner, Barefoot, & Associates, 2005).

While learning communities have existed under many designs for over 70 years, and are an available resource in many colleges; they are an often overlooked tool for retaining students in community colleges. In the 2004 ACT study on student retention, only 33% of the high performing community college campuses and 22% of the low performing campuses surveyed offer learning communities as an intervention for student retention. In the same study learning communities as a curricular offering were only ranked 3.6 on a scale of 1 to 5, with 5 being a major factor and 1 being not a factor in contributing to retention (Habley & McClanahan, 2004).

Often used to describe the process of required placement of students in developmental courses with the express purpose of preparing them for the rigor of college level coursework,

the term mandatory placement is frequently raised in institutional conversations on student retention. It remains a controversial topic within community colleges when establishing administrative policies on assessment and course placement. The majority of the literature provided on the topic of mandatory placement centers around developmental support coursework (Hadden, 2000; Zeitlen & Markus, 1996). Mandatory placement becomes synonymous with remedial and as such raises controversial issues of stigmatism and exclusion. Hadden (2000) pointed out that four-year institutions “act as gatekeepers, totally barring the underprepared from admission until they prove themselves” (p. 832), thus placing the issue of remedial education and mandatory placement squarely on the shoulders of community colleges due to their mission of open access.

Issues of equity in regards to stigmatization, discrimination and diversity, as well as defeating students before they begin are strong concerns. The phrase “allowing students the right to fail” is prominent in policy discussions about mandatory placement.

Mandatory placement becomes a delicate proposition in community colleges due to the college mission of open access. Literature supports that proper assessment and placement of students in the appropriate level of coursework is a valuable strategy for student success, (Hadden, 2000; Zeitlin & Markus, 1996). Yet, while it is standard for community colleges to make assessment upon entry a requirement; they frequently stop short on mandatorily placing students and use the assessment results as a point of recommendation.

The often repeated criticisms that mandatory placement is exclusionary and restricts freedoms, diffuses the execution of the assessment/placement process (Hadden, 2000). Placement recommendations are frequently overridden by students for various reasons relating to financial resources, ego, non-transferability, and impatience. The literature on

mandatory placement focuses on the remedial aspect of education preparation and is therefore limited in its scope (Hadden, 2000; Zeitlin & Markus, 1996).

There is limited statistical research available on developmental support programming models, mandatorily required programming in first-year experience models or student perceptions of mandatory placement. The Community College of Denver employs a mandatory assessment and placement process for first-year students who are qualified as less than twelve postsecondary credits earned. While the study talks about the services offered and the success of the program, there is only anecdotal reporting of student receptivity to the process (Barefoot, Gardner, Cutright, Morris, Schroeder, Schwartz, et al., 2005).

Barefoot (2004) expanded on the problem of student retention in the United States by qualifying that while much research has been conducted over time on the external factors that predispose students to drop out there is limited published research on the impact of the experience of course formats and methods of instruction. The highest attrition of students is between the first and second year (American College Testing [ACT] Program, 1998). According to the ACT, the retention rate is 73% and 50%, respectively, at 4-year and 2-year institutions.

In many college administrations student development services operate under leadership that is separated from academics. This can lead to an imbalance in support provided to students. DMACC's organizational structure is such that district-wide student service leadership reports equally with district-wide academic leadership to the Chief Academic Officer of the college and the opportunity for both academics and student services to collaborate is strong. The College comprises six distinct campuses in central Iowa that serve multiple communities. It functions under a district-wide administrative leadership that

is sensitive to its multiple populations' needs. It is an urban college with three of its campuses situated within the capital city and two surrounding suburbs (Urban Campus, Ankeny Campus and West Campus). It is also a rural college with one of its campuses serving surrounding rural communities (Carroll Campus). The remaining two campuses are situated in small cities (Boone Campus and Newton Campus).

DMACC serves students of all ages that reside primarily in its central Iowa service region. In 2006, 76% of DMACC's credit students were 26 years old or younger, representing a 5-year trend toward younger student enrollments. Ninety-eight percent of DMACC credit students were Iowa residents. Due to tightening immigration laws the number of international students has declined since 2001 to 206 students in 2006.

In 2006, Ankeny Campus served 9,891 students, 58.69% of the total population. Urban Campus located in downtown Des Moines served 2,755 or 16.35% of the total. Boone Campus served 1,898 students, 11.26% of the total. West Campus, located in suburban West Des Moines served 873 students, which comprised 5.18% of the total student population. The Carroll Campus which is located in a rural community served 760 students, 4.51% of the total and Newton Campus served 677 students, 4.02% of the total student population (Des Moines Area Community College, 2007).

Theoretical Framework

The theoretical models that served as the basis for this study were attrition theory (Tinto, 1975), self-efficacy theory (Bandura, 1986), and the motivation theoretical model of attitude, coping, self-efficacy, and locus of control (Bean & Eaton, 2000) which is based in established psychological theories (Bandura, 1986; Fishbein & Ajzen, 1975; French et al.,

1974; Lazarus et al., 1974; Weiner, 1986). In addition, the I.E.O theoretical model (Astin 1993) was used as a lens from which to focus this action research.

Tinto's (1975) student attrition theoretical model, wherein lack of integration into the social and academic constructs of the college leads to low motivation to persist is a widely studied sociological theory that focuses on the conceptualization of the drop out process. Basing his model on Durkheim's psychological theory of suicide, Tinto developed the student attrition model through the lens of educational economics. Students base their decision to persist at an institutional level. If they are not committed to the institution socially or academically they do not perceive a value in a cost benefit decision analysis. While students will cite many tangible reasons for dropping out such as finances, work or family conflicts; those reasons will be secondary to the primary reason which is lack of commitment. In his model of attrition, the experiences that students encounter both academically and socially influence their decision to stay or go. Tinto (1993) expanded on his attrition theory developing a three-stage process for retention that addresses social and academic integration. The three-stage process that students go through is separation from family and community, transition into a new environment and finally incorporation into the environment. How well individual students navigate the process determines their persistence. With that basis, colleges have built multiple social constructs to provide for transition and incorporation. Developing appropriate academic constructs is somewhat more problematic considering the diverse academic programs, student interests and academic levels.

Bandura's (1977) psychological theory of self efficacy, in that confidence relative to one domain should be generalizable to some degree in another domain, provides another layer of depth in the decisions that students make to persist or not. While this theory is long

standing, it is still relative today in studying the problem of student attrition and retention issues. This theory bases on the internal constructs that students bring to their education. Those that are empowered and have achieved success in the academic arena of high school will transfer that confidence to postsecondary instruction. With a pattern of continued academic success, it would be expected that students would persist in their academic pursuits. Developmental education coursework in the areas of reading, writing and math were created to address the needs of academically underprepared students.

Mandatory placement of students into these interventions is often utilized by postsecondary institutions to prepare students for the rigor of college studies and support them in their persistence. Unfortunately developmental coursework, while critical to establishing the self efficacy of students in college, are often stigmatized and the credits do not transfer to programs or other colleges. As part of a comprehensive analysis of the Mandatory Placement Project at DMACC, it was incumbent upon this researcher to consider Bandura's theory of self efficacy in order to identify relationships and relativity of the internal construct factors that students bring with them when entering college. Bandura's theory was also the lens that was used to analyze the efficacy of the mandatory placement experience in the project.

Bean and Eaton (2000) employed a combination of four psychological theories regarding student attrition and synthesized them into a heuristic psychological model of student retention. Their key assumption was that "leaving college is a behavior" (p. 49). They created a theoretical process linking institutional fit with intent to leave and persistence. Bean and Eaton studied three psychological theories regarding student attrition, and applied them

to Tinto's sociological theory of attrition and three-stage model of social and academic integration (Tinto, 1975, 1993).

The first theory examined was coping behavior theory; on how one chooses to respond or cope with any given situation (Lazarus, Averill, & Opton, 1974). In education it can be demonstrated by the academic avoidance behaviors of skipping classes and avoiding homework which negatively impacts academic integration. Similarly social approach behaviors are also attributable to social integration or the lack thereof, i.e. joining campus organizations, working or spending time away from campus. The internal constructs of coping behavior are directly related to Tinto's attrition theory.

In addition to coping theory, Bean and Eaton studied the motivation theory of self-efficacy (Bandura 1986, 1998). Individuals develop a perception of self assuredness in their abilities based on past experiences and observations. This resulting self efficacy directs their willingness to continue or conversely, drop out. Self efficacy is a task specific self awareness. As individuals accumulate successful experiences in a specific area they are more predisposed towards persisting to the achievement of their goals.

In attitude-behavior theory, Fishbein and Ajzen (1975) combined the internal constructs of beliefs, attitudes, intentions and behavior. The model they developed posited that one's beliefs and attitudes direct one's intentions and their resulting behavior. In an educational setting the beliefs and attitudes of students are developed and established by those people who are important to them. Prior to entering college the expectations and beliefs of family, friends and previous education experiences influence students' own beliefs and expectations. They are important influences on student behavior in the college experience.

Weiner's (1986) attribution theory addressed the psychological construct of locus of control. Locus of control is defined as an individual's belief that outcomes are either internal attributes such as skills or aptitude (internal locus of control) or external attributes outside an individual's control (external locus of control). According to Bean and Eaton (2000), multiple studies conducted on this theory have provided evidence that internal locus of control has a positive effect on academic success. They provide this attribute to expand on Tinto's three-stage retention model of social and academic integration. Within the focus of the current study, the input factors of ethnicity, gender, age, and first generation and Pell grant status, while formative to a student's internal locus of control could not be controlled. In addition, while this internal locus of control has the potential to reorient by the social integration dynamics of the environments experienced in the project, these dynamics were beyond the resources of this study to qualify or address.

Finally, as this researcher focused on student retention and potential programming support mechanisms for community colleges, it was important to identify the factors that were potentially predictive of student success in persisting towards their academic goals. The theoretical I-E-O model of Astin (1993) was integral to making sense of the data. The I-E-O model is defined as: input-environment-outcomes. This model of analysis provided a rich comprehensive picture of each of the instructional paradigms and was a critical aspect in identifying and establishing a comprehensive and research based policy for supporting first-year students at DMACC.

Summary

Advancing to the next link of increasing student retention and persistence by channeling students into a directed supportive platform seems obvious, but is not widely adopted as a model. The connection has yet to be solidified.

At the 2006 Summer Institute on First-Year Assessment sponsored by Policy Center on the First-year of College; there was widespread interest in retention and persistence in the development of first-year experiences, there was also a broad and diverse scope in first-year practices offered by institutions. Many models have been created in the area of student engagement and persistence based on Tinto's (1993) three-stage process of academic and social integration with the majority of the practices instituted at four-year colleges and with strongest emphasis on social constructs. Throughout various sessions and discourses, it was apparent that generalized student engagement in the social constructs alone does not necessarily promote persistence. Actually, in group discussions with peer educators from four-year colleges, strong social integration without the support of academic integration caused decreased GPA and subsequent attrition.

In solving the dilemma of student retention, the need to address multiple variables exists. Community colleges differ from four-year institutions in that they grapple with commuter based enrollments and diverse student populations. Employing the combination of Tinto's (1993) three stage process of integration, as well as Bean and Eaton's (2000) heuristic psychological model of student retention in developing interventions seems best suited when addressing the unique retention issues faced by community colleges in student persistence. The Mandatory Placement Project that DMACC seeks to learn from provided

predominantly academically based protocols in several different options that would meet the needs of a diverse student population.

CHAPTER 3.

METHODOLOGY

Overview

The purpose of this study was to conduct a statistical analysis focusing on student persistence from fall to spring term within a directed first-year supportive academic experience project. This project was conducted with a sample of first-time, full-time, late registering students at the Des Moines Area Community College Ankeny Campus. This chapter provides the non-experimental research design utilized in completing the study. A description of the research questions and hypotheses, the population and sample, data resource and collection, variables used and method of analysis are provided.

Research Questions

This research focused on fall-spring persistence of students in the studied sample. Quantitative research methodologies of descriptive and inferential statistics were selected for the analyses. The Statistical Package for Social Science (SPSS) software was used to conduct the analytics.

The researcher employed a non-experimental mode of inquiry using descriptive statistics with frequency distributions to provide a profile of the sample and participation in each of the environments. Cross tabulations were employed to examine relationships between the variables and develop a detailed picture of the project study. Inferential statistical procedures of Pearson correlation and blocked multiple regression were employed to test the hypotheses and study the predictability of any of the variables in persistence from fall-spring. Pearson correlation analysis was employed to identify significant correlations between the

independent variables and the dependent variable of fall-spring persistence. Multiple regression using the standard enter method was used in a block regression to observe changes in significance in relationships of the variables between the models. The conceptual I-E-O model (Astin, 1993) was used in the regression to make sense of the data. A level of $p < .05$ was established in the study to determine significance.

The variables used for this study included demographic input factors of gender, age categories, race, sample groups, first generation status, Pell grant status and participation as well as the environmental factors of the College Experience, Study Strategies, Learning Communities, College Prep Reading, College Prep Writing and College Prep Math (Appendix B). The output performance characteristic factors of 100% credit retention; fall-spring persistence and term $GPA \geq C$ were also studied.

There were three major questions that the researcher addressed in this study. The performance characteristic of fall-spring persistence was designated as the dependent variable and the focus of the analysis. The questions that guided the study were:

1. Do any of the demographic factors of race, gender, age, first generation Pell grant status, participation, and pilot or control have an effect on the fall-spring persistence of late registrants?
2. Does participation in any of the first semester college course environments by late registrants have an effect on fall-spring persistence for late registrants?
3. Do any of the performance characteristics have an effect on fall-spring persistence for late registrants?

Hypotheses

Null hypotheses were developed for each of the questions to identify if any of the independent variables of input, environment or output in the project study demonstrated any significant relationships with the dependent variable of fall-spring persistence. As the hypothesis of this study was based on the premise that there was an effect between the Mandatory Placement Project treatment for late registrants and fall- spring persistence the following questions were used to test for the null hypotheses:

NH1. None of the seven demographic input variables of gender, age categories, race, first generation student status, Pell grant recipient status, and participation or sample groups of pilot versus control have an effect on fall – spring persistence for late registrants.

NH2. Participation in environment variables of The College Experience, Study Strategies, Learning Communities, College Prep Reading, College Prep Writing and or College Prep Math courses by late registrants has no effect on fall-spring persistence for late registrants.

NH3. The output variables or performance characteristics of 100% Credit Retention or Term $GPA \geq C$ have no effect on fall-spring persistence for late registrants.

Institutional Description

Des Moines Area Community College (DMACC) is a publicly supported two-year postsecondary institution. The community college is comprised of six campuses which serve an 11-county district that covers 6,550 miles in central Iowa. DMACC serves multiple populations. It is an urban college with three campuses, one situated in the capital city and

two situated in surrounding suburbs. It is also a rural college with one campus serving surrounding rural communities. The remaining two campuses are situated in small cities. The urban campus locations are in Ankeny, downtown Des Moines and West Des Moines. The rural campus is located in Carroll and the two small city campuses are located in Boone and Newton, Iowa respectively.

DMACC also supports two educational centers that focus on adult basic education and high school dual credit programming. The Success Center is located on the south side of Des Moines and the Career Academy, Hunziker Center is located in Ames. DMACC serves as a major education and training center for central Iowa. The community college offers career programs in health care manufacturing, construction trades, technology and business sectors as well as transfer and pre-professional curriculum.

In 2006, DMACC enrolled 26,801 credit students; 4,891 were full-time and 21,910 were part-time (enrolled for less than 12 credit hours). These students enrolled in 325,384 credit hours through 6,762 course offerings. Female students comprised 56% of the credit student population; male students comprised 44%. Among race/ethnic categories of enrollment, the Hispanic population was 751 students. Black student enrollment for the year was 1,394 students. Asian/Pacific Islander student enrollment was 899 students. The American Indian/Alaskan Native population was 110 enrolled students. White students comprised the majority race/ethnic group at 20,822 students, 78% of the student body (Des Moines Area Community College, 2006).

DMACC serves students of all ages that reside primarily in its central Iowa service region. In 2006, 76% of DMACC's credit students were 26 years old or younger, representing a 5-year trend toward younger student enrollments. Ninety-eight percent of

DMACC credit students were Iowa residents. The number of international students has declined since 2001 and in 2006 was at 206 students.

In 2006, the Ankeny campus served 9,891 students, 58.69% of the total population. Urban campus located in Des Moines served 2,755 or 16.35% of the total. The Boone campus served 1,898 students, 11.26% of the total. West campus, located in suburban West Des Moines served 873 students, which comprised 5.18% of the total student population. The Carroll campus, located in a rural community served 760 students, 4.51% of the total and the Newton campus served 677 students, 4.02% of the total student population (Des Moines Area Community College, 2007).

Sample Selection

The sample for this study was drawn from 6,557 students attending the Ankeny campus of DMACC in Fall 2006, and 6,693 students attending the same campus in the Fall of 2007. The students selected for the project were identified as late registrants for meeting the following criteria. They were all first-time, full-time students who enrolled at DMACC Ankeny Campus within a window of two weeks prior to fall semester and up through the first week of classes. They enrolled in a general liberal arts program of study.

Variables

The sample was divided into two groups based on their actual registration in the college: pilot cohort and control cohort. The pilot cohort consisted of students who were directed or strongly advised to enroll in one of the studied course options and required to meet with an advisor prior to schedule changes or re-enrollment for spring semester. The control cohort used for comparative analysis was comprised of late registering students who

were first-time, full-time, DMACC students that enrolled in classes during the first week of school; not required to enroll in any of the project courses and not required to meet with an advisor prior to schedule changes or re-enrollment for spring semester. While these students were equally identified as low-persistence as the students who registered during the two weeks prior to class start, the College admissions and advising office was fully extended in its capacities with the beginning of the semester and unable to accommodate the additional staffing needed to extend the implementation of the project into the first week of classes.

The categorical variables of input (Astin, 1993) consisted of two distinct samples of first-time, full-time students enrolled at the DMACC Ankeny Campus in the fall semesters of 2006 and 2007 that were identified as late registrants by the Office of Institutional Effectiveness at the College. The pilot sample consisted of 270 students who were directed or strongly advised to participate in one or more of the common first-year experience courses provided: The College Experience, Study Strategies, Learning Communities, College Prep Reading, College Prep Writing and College Prep Math. They were also required to meet with an advisor prior to changing their schedules or re-enrolling in the following semester. The control sample consisted of 174 full-time students who met the criteria set by the college as late registrants, yet registered and enrolled for full-time course study during the first week of the fall semester. This control sample was not provided the intensive advising into any of the studied first-year experience courses nor were they required to meet with an advisor prior to changing their schedules or re-enrolling in the following semester.

Descriptive statistics of frequencies and cross tabulation were used to develop an introductory picture of the demographic variables that were used to explore the data and examine differences. The variables that were studied were: student age, gender, race (White,

Non-Hispanic; Black, Non-Hispanic; Hispanic; Asian/Pacific Islander; American Indian/Alaskan Native; Other/choose not to reply), personal background (first-generation college student), Pell grant status, participation and sample group (pilot and control).

The intrusive advisement of students into the individual course options of the College Experience; Study Strategies; Learning Community options, College Prep Reading, College Prep Writing and/or College Prep Math provided the variables of environment that were studied for output (Astin, 1993). The output variables used were fall-spring persistence, 100% credit retention and term GPA \geq C. The visual map of the variables (see Figure 1) demonstrates the process that was implemented to study and test Tinto's (1975) theory of interaction, Bandura's theory of self efficacy and Bean and Eaton's (2000) psychological model of college student retention.

Data Collection

Secondary data provided by Des Moines Area Community College were used to conduct the research of the mandatory placement project study. Administrative data sets from the DMACC banner system for fall 2006 to spring 2007 and fall 2007 to spring 2008 were

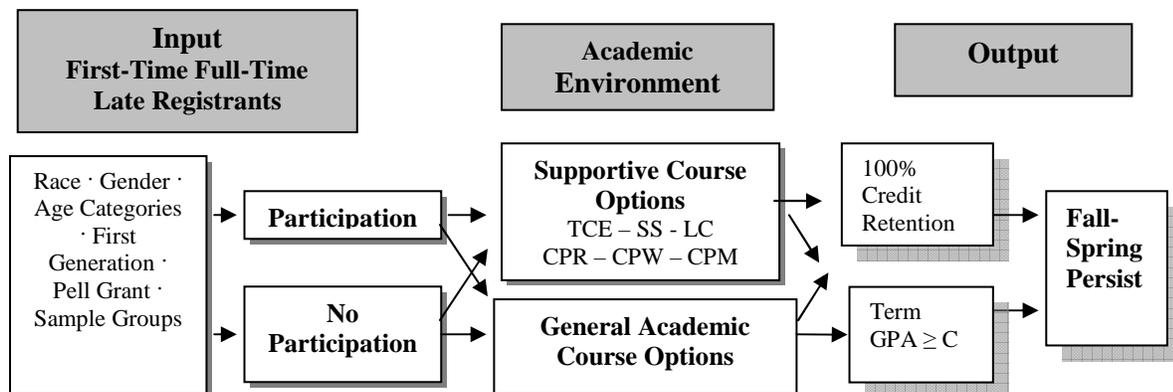


Figure 1. Variables of the study

used for the analysis. All data provided by the College were accessed in compliance with the Family Educational Rights and Privacy Act (FERPA) and DMACC policy. At no time were individually identifiable data disclosed.

In compliance with human subject protections regulations and upon approval from the researcher's program of study, an application for the use of this secondary data source was submitted to the Iowa State University Institutional Review Board (IRB). On May 30, 2007 the researcher was notified by the IRB that the study is exempt from the requirements as described in 45 CFR 46.101(b) (1) (Appendix C).

Method of Analysis

Employing the I-E-O model of Astin (1993) to make sense of the data a descriptive statistical analysis in a non-experimental mode of inquiry provided a clear picture of the input of the samples. Descriptive statistics of frequencies and cross-tabulations were conducted to assimilate a comprehensive picture of the demographic variables of each of the two samples (Pilot, Control) to in regards to age categories, gender, race, Pell grant status, academic environment participation, and course credits retained, term GPA and fall – spring persistence. Bivariate statistical analyses of Pearson's correlation were conducted to identify significant positive linear correlations between the independent variables and the dependent variable of fall-spring persistence. A significance level of $p < .05$, one-tailed, was set to study the significance.

To test the null hypotheses for the I-E-O frame of the study and identify which if any variables contributed significantly to the predictability of the dependent variable of fall-spring persistence a block multiple regression analysis was conducted to study significance

and measure influence. There were three block models employed in the regression. The first block included the independent variables of input (race, gender, age categories, first generation status, Pell grant status, participation and sample groups). The second block included the independent variables of environment (The College Experience, Study Strategies, Learning Community courses, College Prep Reading, College Prep Writing, and College Prep Math). The third block included the independent variables of output: 100% credit retention and term $GPA \geq C$.

Summary

Community colleges with their non-traditional student base and commuter status face unique challenges in the area of student persistence. The statistical analysis models selected provided insight into the effectiveness of requiring late registering students to participate in first-year academic supportive environments at Des Moines Area Community College. It also identified the variables influential towards predicting fall-spring persistence. The insight gained from this research provided valuable information to DMAACC in the development of effective processes that would enhance student persistence for their diverse population.

CHAPTER 4.

RESULTS

The purpose of the study was to provide a quantitative research based analysis regarding the efficacy of the Mandatory Placement Project of identified full-time late registering students enrolling in DMACC for the first time. Each identified first-year environment provided in the project was studied to provide insight into the effectiveness and validity of mandatory placement of students into these directed environments. Chapter 3 addressed the design and methodology employed in the study to address research questions posed by the researcher. This chapter presents the results of the quantitative analysis.

Analysis

The research questions that guided this study were:

1. Do any of the demographic factors of race, gender, age, first generation Pell grant status, participation, and pilot or control have an effect on the fall-spring persistence of late registrants?
2. Does participation in any of the first semester college course environments by late registrants have an effect on fall-spring persistence for late registrants?
3. Do any of the performance characteristics have an effect on fall-spring persistence for late registrants?

Null hypotheses were developed for each of the questions to identify if any of the independent variables of input, environment or output in the project study demonstrated statistically significant relationships with the dependent variable of fall-spring persistence. As the hypothesis of this study was based on the premise that there was an effect between

the Mandatory Placement Project treatment for late registrants and fall-spring persistence, the following questions were used to test for the null hypotheses:

NH1. None of the seven demographic input variables of gender, age categories, race, first generation student status, Pell grant recipient status, participation or sample groups of pilot versus control have an effect on fall-spring persistence for late registrants.

NH2. Participation in environment variables of The College Experience, Study Strategies, Learning Communities, College Prep Reading, College Prep Writing and or College Prep Math courses by late registrants has no effect on fall-spring persistence for late registrants.

NH3. The output variables or performance characteristics of 100% credits retained or Term GPA \geq C have no effect on fall-spring persistence for late registrants.

The researcher employed a non-experimental mode of inquiry using descriptive statistics with frequency distributions to provide a profile of the sample and participation in each of the environments. Cross tabulations were employed to examine relationships between the variables and develop a detailed picture of the project study. Inferential statistical procedures of Pearson correlation and block multiple regression were employed to test the hypotheses and study the predictability of any of the variables relative to persistence from fall-spring. Pearson correlation was employed to identify significance between the independent variables and the dependent variable of fall-spring persistence. Multiple regression using the standard method was selected for use in the block regression to observe changes in significance in relationships of the variables between the models. The conceptual I-E-O model of Astin (1993) was used in the regression to make sense of the data. A significance level of $p < .05$, one-tailed was set to study the significance.

Demographics

Of the six DMACC campuses, the Ankeny campus was selected for the mandatory placement project due to its size. As the largest of the campuses, it provided the highest resource of available sections offered in each of the studied environments. Ankeny campus was also the only campus that offered all of the selected environments chosen for the project study during the period of the project.

In developing the input aspect of the study, descriptive analyses using frequencies and percentages of 444 first-time late registering students enrolling at Ankeny campus in the fall semesters of 2006 and 2007 was employed to develop a picture of the demographic make-up. Students were categorized into two separate samples depending on their actual class registration dates. The samples for study were designated as pilot and control. The pilot sample consisted of 270 late registrants who registered for classes as first-time, full-time students during the two weeks prior to the semester start during the fall of 2006 and 2007 (158 full-time students from fall 2006 and 112 students from fall 2007) The control sample consisted of 174 first-time, full-time students (106 in fall 2006, and in 68 in fall 2007) who enrolled in classes during the first week of the semester.

While the two years of the project were grouped together for this study, it was interesting to note that the similarities in the demographic variables when looking at each of the individual years of the study (Table 1). The variables considered were gender, race, age categories, Pell grant status, and first generation status.

Gender distribution of the participants in the sample ($N=444$) (Table 1) indicated that overall male students comprised 60.6% of the population and female students comprised 39.0% with one unidentified gender and one record missing. Cross tabulation analysis

identified similarities within the pilot and control samples. Likewise, consistent with the overall gender distribution, females made up 38.9% of the pilot sample and 39.1% of the control sample. The ratios of males and females showed no appreciable change when broken out for each of the studied years. Men comprised 59.9% of the sample for fall term 2006 and 62.2% for fall 2007. Women comprised 40.2% of the sample in fall term 2006 and 37.2% in fall 2007.

While the data identified no appreciable differences in sample percentages between gender make-ups during either of the two years of the study, it was noted that overall, significantly more men (61%) than women (39%) were late registrants in comparison to the DMACC general population gender split as well as national data on community college enrollment. Overall, during the time of the study, DMACC reflected female enrollment of 56.1% in 2006 and 55.9% in 2007 (Kaufman, 2008) and in national data for community colleges 2003-04 (Provasnik & Planty, 2008) women made up approximately 59% of community college students. From the gender analysis of this study it would appear that more men than women made the decision to start college late.

Of the studied population 81.5% of the students were white, 13.6% were minority, 4.7% were of unknown ethnic status and one record was missing. The racial distribution for the project was consistent with the college as a whole during the same time period. Whites comprised 87.4% of the total population across the entire DMACC district. Minorities made up 12.2% and unknown students were 9.4% (Kaufman, 2008). Analysis of race within the pilot and control samples was conducted and the percentages within each of the sample populations remained consistent with overall ethnic makeup of the study participants (Table 1). No statistically relevant information was discerned. The categorical numbers of minorities

Table 1. Demographics and frequencies of the sample (N=444)

Variable	Pilot (n=270)		Control (n=174)	
	Count	Percentage	Count	Percentage
<i>Year of Participation</i>				
Year 2006	158	58.9	106	60.9
Year 2007	112	41.5	68	39.1
<i>Gender</i>				
Male	165	61.1	104	59.8
Female	105	38.9	68	39.1
Unidentified			2	0.4
<i>Race</i>				
White	221	81.9	141	81.0
Unknown	12	4.4	10	5.7
White/Unknown	233	86.3	151	86.8
Black	6	2.2	10	5.7
Hispanic	16	5.9	4	2.3
Asian	15	5.6	6	3.4
American Indian	0	0.0	3	1.7
Minority	37	13.7	23	13.2
<i>Age</i>				
≤ 24	244	90.4	152	87.4
25-35	21	7.8	13	7.5
≥36	5	1.8	8	4.6
Unknown	0	0.0	1	0.5
<i>Pell Grant (n=112)</i>				
		(n=71)		(n=41)
Male ≤ 24	35	49.3	21	51.2
Male 25-35	2	2.8	1	2.4
Male ≥36	2	2.8	0	0.0
Female ≤ 24	24	33.8	13	31.7
Female 25-35	7	9.9	3	7.3
Female ≥36	1	1.4	2	5.0
Unknown ≤24	0	0.0	1	2.4
<i>First Generation (n=253)</i>				
		(n=157)		(n=96)
Male ≤ 24	93	59.2	52	54.3
Male 25-35	6	3.8	4	4.2
Male ≥36	1	0.7	1	1.0
Female ≤ 24	51	32.5	34	35.4
Female 25-35	6	3.8	3	3.1
Female ≥36	0	0.0	1	1.0
Unknown ≤24	0	0.0	1	1.0

in the study were so few that for the purposes of this study, participants were grouped into two main categories: white/unknown and minority.

Overall, 253 students from the population reported being first generation college students. Of the students in the pilot sample, 58.1% identified themselves as first generation as did 55.2% of the students in the control sample. There was similar consistency between the pilot and control samples when analyzing economic status. A total of 112 students in the sample self-identified low economic status as indicated by being Pell grant recipients.

For the purposes of this study student age was regrouped into three categories: Traditional aged students were categorized as ≤ 24 years, non-traditional aged students included 25-35 year olds and the third category included students ≥ 36 years. The mean age for students in this study was 20.69 years old. The predominate age for students in this study was 18 years ($n=140$) followed by 19 ($n=93$) and then 20 ($n=66$) (Figure 2.). Overall, 396 students were under 24 years of age and 34 students were 25 to 35 years old. Less than three percent of the population was 36 years of age or older with one student not reporting. The

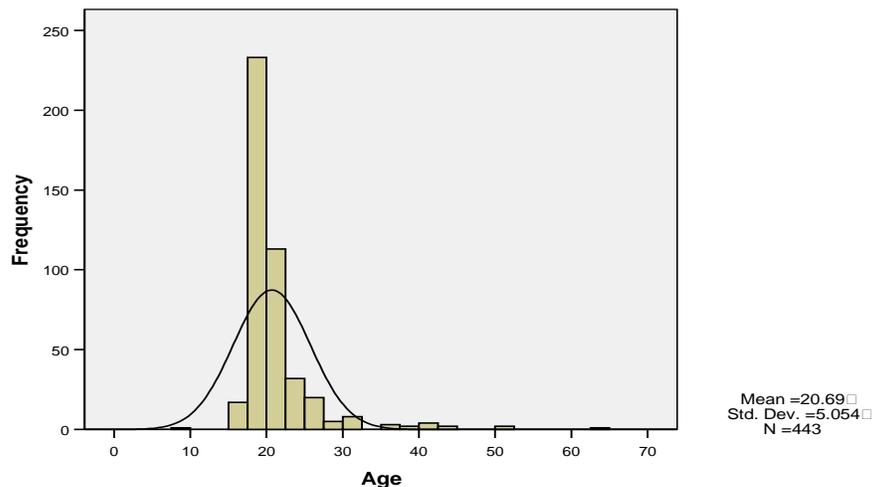


Figure 2. Mean age histogram

majority of the students assigned to this research were categorized as traditional age college students. DMACC's overall age demographics for the same time period indicate that 18-22 year-olds comprised 57.8% of the student population (Kaufman, 2008).

Participation

Each of the academic environments was reviewed for the demographic input factors of age category, race, gender, first-generation and Pell Grant status. Student ages were separated into three categories: ages 24 and under, 25-35, and 36 years old and over (Table 1).

Among the two samples of pilot and control students there were a total of 471 individual enrollments in the project environments. Depending on individual need and interest students had the option of enrolling in multiple environments. The control sample participated in 14.9% ($n=70$) of the enrollments within the environments and 85.1% of the enrollments ($n=401$) came from the pilot sample. Consistent with the age demographics of the project, 90.9% of participation in any of the studied environments came from the traditional age category ≤ 24 . Slightly over nine percent were in the non-traditional age categories (7.6% were 25-35, and 1.5% were ≥ 36).

Of the 396 students in the traditional age category, participation was highest in the Study Strategies environment (31.6%). This was followed closely by Learning Communities (30.8%) and then College Prep Math (29%). The College Experience, with 14.1% participation, was just slightly more selected over College Prep Reading at 9.8% and College Prep Writing at 9.1%, respectively.

A total of 44 environments were selected by the 34 students in the 25-35 age category. College Prep Math at 38.2% was the most frequently selected environment. Study Strategies with 32.4% participation, Learning Communities (32.4%), College Prep Reading (11.8%), and College Prep Writing (11.8%), followed respectively. The least selected environment was the College Experience with only 2.9% participation.

Of the 13 students who fell in the age category of ≥ 36 , only eleven environments were selected. This group appeared to be least receptive to participation in the Mandatory Placement Project environments. College Prep Writing at 23.1% was the most selected environment with Study Strategies (15.4%), Learning Communities (15.4%) and College Prep Math (15.4%) demonstrating equal frequencies. The College Experience with 7.7% participation and College Prep Reading (7.7%) were the least selected environments in this older age category.

Race was defined into six ethnicities by DMACC at the time of this study. They were White Non-Hispanic (White), Black Non-Hispanic (Black), Hispanic (Hispanic), Asian/Pacific Islander (Asian), American Indian/Alaskan Native (American Indian), and Other/choose not to reply (Unknown). White students made up the highest percentage of participants in the project (81.5%). Blacks were 3.6% of the sample, Hispanics comprised 4.5%, Asians 4.7%, American Indians less than 1% and the unknown category contributed to fewer than 5%. The unknown variable consisted of 22 students. For the purposes of analysis and to reduce impact within each of the environments unknown students were grouped with the white students into the white/unknown variable. Because the numbers for any single race category were too small to be generalized to that race of student, all Black ($n=16$), Hispanic ($n=20$), Asian ($n=21$), and American Indian ($n=3$) participants were grouped into a single

minority variable and were examined as units when conducting an in-depth study of the individual environments. There were a total of 60 minority students identified in the project study (Table 1).

There were six academic environments from which students could select in the Mandatory Placement Project. In order of frequency of selection they were College Prep Math ($n=140$), Study Strategies ($n=138$), Learning Communities ($n=135$), the College Experience ($n=58$), College Prep Reading ($n=44$) and College Prep Writing ($n=43$). Study Strategies, Learning Communities and College Prep Math were the three most frequently selected environments for students in the project.

The white/unknown variable comprised the highest demographic frequency with 384 students. There were three environments that were equally selected by this group. Study Strategies (32.0% participation), Learning Communities (31.5% participation) and College Prep Math (29.9% participation) were the top three environments. The College Experience with 14.1% participation was the fourth choice. The least frequently selected environments for this race variable were College Prep Reading with 7.7% participation and College Prep Writing with 6.6% participation. Minorities appeared to select College Prep Math most frequently (41.7%) of any of the environments. The least selected environment for minorities was The College Experience with 6.7% participation. Participation was fairly consistent at approximately 25% within the remaining four environments (Table 2).

When reviewing gender participation, males appeared to be most receptive to the College Prep Math environment with 33.5% participation. Study Strategies and Learning Communities with male participation at 32% each, followed closely. The College Experience with 12.6% participation was the fourth most selected environment. College Prep Reading

Table 2. Frequencies of demographic variables within environments (N=444)

	TCE (N=58)		SS (N=138)		LC (N=135)		CPR (N=44)		CPW (N=43)		CPM (N=140)	
	<i>n</i>	%	<i>n</i>	%								
<i>Race</i>												
W/U (n=384)	54	14.1	123	32	121	31.5	30	7.8	27	7	115	29.9
M (n=60)	4	6.7	15	25.0	14	23.3	14	23.3	16	26.7	25	41.7
<i>Gender (Male=269, Female=173)</i>												
Male	34	12.6	87	32.0	86	32.0	23	8.6	20	7.4	90	33.5
Female	24	13.9	51	29.5	49	28.3	21	12.1	20	11.6	50	28.9
<i>First Generation (N=253)</i>												
Male	22		49		51		9		9		53	
Female	13		23		26		10		13		26	
W/U	34		67		72		15		17		68	
M	1		5		5		1		5		11	
Total	35	13.8	72	28.5	77	30.4	19	7.5	22	8.7	79	31.2
<i>Pell Grant (N=112)</i>												
Male	12		19		23		6		6		29	
Female	11		24		21		6		5		3	
W/U	22		40		41		11		10		29	
M	1		3		3		1		1		3	
Total	23	20.5	43	38.4	44	39.3	12	10.7	11	9.8	32	28.6
<i>Age Categories</i>												
≤ 24	56		125		122		38		35		125	
25-35	1		11		11		4		5		13	
≥ 36	1		2		2		1		3		2	
Unknown							1					

(8.6%) followed by College Prep Writing (7.4%) were the least frequently selected environments for males (Table 2).

Females in the study, participated fairly equally in the three environments of Study Strategies (29.5%), College Prep Math (28.9%) and Learning Communities (28.3%). The College Experience (13.9%), College Prep Reading (12.1%) and College Prep Writing with 11.6% participation were selected less frequently.

As noted previously, 253 (57%) of the population were first generation college students. Of those, one third selected the environments of Study Strategies (28.5%), Learning

Communities (30.4%) and College Prep Math (31.2%). The College Experience was the next most common environment with 13.8% participation. College Prep Reading (7.5%) and Writing (8.7%) were the least selected environments for first generation students (Table 2.).

Frequency analysis of the low income students provided that 25% of the sample demonstrated financial need through Pell Grant status. Within the six environments of the study, Pell grant students most frequently selected Learning Communities (39.3%) and Study Strategies (38.4%). College Prep Math (28.6%) was the third most frequently selected environment. College Prep Reading (10.7%) and College Prep Writing (9.8%) participation were the least selected environments (Table 2).

Academic Environment

Cross tabulations and frequency distributions within each of the environments were conducted to identify the number of students who participated and whether they were part of the pilot sample or control sample. The environments analyzed were: The College Experience, Study Strategies, Learning Communities and College Prep Reading, College Prep Writing and College Prep Math. Descriptions and competencies for these courses are provided in the Appendix B. There were 37 available Learning Communities offered within the studied time frame (16 - fall 2006, 21 - fall 2007). They included multiple pairings of English Composition I/Study Strategies, English Composition I/Humanities, Psychology/Study Strategies, History/Study Strategies, English Composition II/Literature, Speech/Literature, Speech/Education, Sociology/Study Strategies, Speech/History, Math/Math Study Strategies, College Prep Reading I/College Prep Writing I, College Prep Reading II/College Prep Writing II, English Composition I/Agriculture, and

Speech/Culinary. While a few were taught as coordinated Learning Communities where both instructors actively merged the courses and team taught both; the majority were offered as linked communities where the instructors taught independently; however, linked instruction and assignments to coordinate between the two courses.

Students who assessed above the established assessment cut scores were directed to enroll in a minimum of one environment. Of the environment options given, the College Experience ($n=58$) was the least frequently selected by students. Study Strategies ($n=138$) and Learning Communities ($n=135$) were the most frequently selected. All credits earned in these environments were transferable to four-year institutions.

For the purposes of analysis individual developmental courses were grouped according to discipline, i.e., College Preparatory Reading I and College Preparatory Reading II were identified as College Preparatory Reading (CPR). College Preparatory Writing I and College Preparatory Writing II were grouped together and identified as College Preparatory Writing (CPW). Likewise College Preparatory Math (CPM) included Arithmetic, Pre-Algebra and Elementary Algebra I & II (Appendix B). College Prep credits while important for the preparation for college level coursework are not transferable to four-year institutions. This issue while not studied in this research must be considered in the findings overall.

With a total of 401 reading assessment scores provided, 134 students demonstrated need for College Prep Reading. Only 32.8% students from the study participated in the coursework. Of the 402 writing scores provided, a total of 127 students demonstrated need for College Preparatory Writing. Of those who demonstrated need for writing support only 33.9% participated in College Prep Writing. Likewise, of the 406 math assessments, a total of 244 students demonstrated need for College Prep Math (Table 3). Of these, 57.3%

Table 3. Assessment scores and participation in college prep environments

Assessment	Scores Provided	Below Cut Score	CP Participation
Reading	401	134	44
Writing	402	127	43
Math	406	244	140
Total	1,209	505	227

participated in the remedial math coursework. This was the most selected of the three developmental environments.

The Mandatory Placement Project included a two-course component for students who assessed at a level below the DMACC established cut scores addressed earlier in the chapter. Students who assessed below the established cut scores were directed to enroll in two environment selections from any of the College Preparatory courses, Study Strategies or the College Experience. Learning Communities of developmental courses were also provided for selection. Within the individual environments of the developmental courses, College Prep Reading ($n=44$) and College Prep Writing ($n=43$) were the least frequently selected environments for participation. College Prep Math ($n=140$) had the highest participation of the three developmental environments and the highest participation of any of the six environments overall.

Course Credit Retention

While the project provided intensive directed advisement for participating in one or more of the supportive environments, participation was not an absolute requirement. Within each of the two studied samples there were students who participated and students who did not. The element of required face-to-face advising in regards to schedule changes or re-enrollment for the following semester was a non-negotiable element of the project for all

students in the pilot sample only and any in-depth analysis of course credits retained must reflect that factor. Analysis of the output variables included participation and non-participation within each of the samples studied.

Data analysis of the Course Credit Retention variable for the sample demonstrated that 57.2% of the students in the study retained 100% of their credits. Reviewing the variable by participants and non-participants of the environments the data demonstrated that at end of term participants retained 100% of their credits at a rate of 61.7% versus non-participants (49.7%). Frequencies analysis within the pilot sample indicated similar findings. The pilot sample retained 100% of their credits at term end at a rate of 61.9% and the control sample retained credits at a rate of 50.0% (Table 4).

Overall there were 96 more males than females in the study. Gender analysis demonstrated that a slightly higher percentage (approximately 3%) of females retained 100% of their credits versus males. Females who participated in an environment retained credits at a rate of 13.7% higher than female non-participants, while males who participated retained all their credits at a rate 11.1% higher than their counterparts who did not participate.

Participation or non-participation in the environments appeared to have little impact on the percentage of first generation students in the area of credits retained. Overall, 57.7% of the identified first generation students retained 100% of their course credits. This was only 4.7% higher than non-participants from the same category at the end of term. Reviewing the data for the variables of Pell grant status, the percentages were fairly consistent. Nothing remarkable was noted. Minorities who participated (65.8%) and females who participated (64.4%) in an environment retained 100% of their credits at the highest rate overall. Also 64.2% of the students who persisted to the following semester retained 100% of their credits.

Table 4. Course credits retained by demographic inputs (N=444)

Variable	Pilot (n=270)		Control (n=174)		Total	
	n	%	n	%	n	%
<i>100% Credits Retained</i>	167	61.9	87	50.0	254	57.2
Participant (n=277)	139		32		171	
Non-Participant (n=167)	28		55		83	
<i>White/Unknown (n=384)</i>	233	60.7	151	39.3	384	100.0
<i>100% Credits Retained</i>	142	60.9	75	49.7	217	56.5
Participant (n=239)	118		28		146	
Non-Participant (n=145)	24		47		71	
<i>Minority (N=60)</i>	37	61.7	23	38.3	60	100.0
<i>100% Credits Retained</i>	25	67.6	12	52.2	37	61.7
Participant (n=38)	21		4		25	
Non-Participant (n=22)	4		8		12	
<i>Pell Grant Status (n=112)</i>	71	63.4	41	36.6	112	100.0
<i>100% Credits Retained</i>	42	59.2	21	51.2	63	56.3
Participant (n=74)	37		8		45	
Non-Participant (n=38)	5		13		18	
<i>First Generation (n=253)</i>	157	62.0	96	38.0	253	100.0
<i>100% Credits Retained</i>	93	59.2	53	55.2	146	57.7
Participant (n=151)	75		15		90	
Non-Participant (n=102)	18		38		56	
<i>Males (n=269)</i>	165	61.3	104	38.7	269	100.0
<i>100% Credits Retained</i>	102	61.8	49	47.1	151	56.1
Participant (n=173)	83		21		104	
Non-Participant (n=96)	19		28		47	
<i>Females (n=173)</i>	105	60.7	68	39.3	173	100.0
<i>100% Credits Retained</i>	65	61.9	37	54.4	102	59.0
Participant (n=104)	56		11		67	
Non-Participant (n=69)	9		26		35	
<i>Unknown (n=2)</i>			2	100.0	2	100.0
<i>100% Credits Retained</i>			1	50.0	1	50.0
Participant (n=0)			0		0	
Non-Participant (n=2)			1		1	
<i>Persisted (n=279)</i>	173	62.0	106	38.0	279	100.0
<i>100% Credits Retained</i>	118	68.2	61	57.5	179	64.2
Participant (n=173)	98		21		119	
Non-Participant (n=106)	20		40		60	

Term GPA Output

In analyzing the variable of term GPA for students, quality point equivalents of grade letters A-F were used to make sense of the data (Table 5). The data provided no distinction between students who fell into the category of grade letter F either by dropping the course during the semester or receiving a numerical grade of .00. The benchmark of C or better was selected for this study as 2.0 was the standard to maintain enrollment in satisfactory status. Term GPA below C placed students into academic warning. Of the sample, a total of 198 students (44.6%) completed the fall term with a GPA of C or better. Further analysis of the data provided that 44.0% of the students who participated in at least one environment earned a term GPA of C or better. A slightly higher percentage of students (45.5%) who did not participate in at least one directed environment achieved a term GPA of C or better (Table 6).

White/Unknowns achieved a term GPA of C or better at a rate of 44.8% while minorities achieved the term GPA of C or better at a slightly lower rate of 43.3%. It was

Table 5. GPA letter grade distribution

<i>Grade</i>	<i>Quality Point Range</i>	
A	3.68	4.00
A-	3.34	3.67
B+	3.01	3.33
B	2.68	3.00
B-	2.34	2.67
C+	2.01	2.33
C	1.68	2.00
C-	1.34	1.67
D+	1.01	1.33
D	0.68	1.00
D-	0.01	0.67
F	0.00	0.00

Table 6. Term GPA by demographic inputs (N=444)

Variable	Pilot (n=270)		Control (n=174)		Total	
	n	%	n	%	n	%
<i>Term GPA ≥ C</i>	126	46.7	72	41.4	198	44.6
Participant (n=277)	102		20		122	
Non-Participant (n=167)	24		52		76	
<i>White/Unknown (n=384)</i>	233	60.7	151	39.3	384	100.0
<i>Term GPA ≥ C</i>	108	46.4	64	42.4	172	44.8
Participant (n=239)	87		20		107	
Non-Participant (n=145)	21		44		65	
<i>Minority (N=60)</i>	37	61.7	23	38.3	60	100.0
<i>Term GPA ≥ C</i>	18	48.6	8	34.8	26	43.3
Participant (n=38)	15				15	
Non-Participant (n=22)	3		8		11	
<i>Pell Grant Status (n=112)</i>	71	63.4	41	36.6	112	100.0
<i>Term GPA ≥ C</i>	32	45.1	20	48.8	52	46.4
Participant (n=74)	28		5		33	
Non-Participant (n=38)	4		15		19	
<i>First Generation (n=253)</i>	157	62.0	96	38.0	253	100.0
<i>Term GPA ≥ C</i>	75	47.8	45	46.9	120	47.4
Participant (n=151)	60		9		69	
Non-Participant (n=102)	15		36		51	
<i>Males (n=269)</i>	165	61.3	104	38.7	269	100.0
<i>Term GPA ≥ C</i>	67	40.6	34	32.7	101	37.5
Participant (n=173)	49		11		60	
Non-Participant (n=96)	18		23		41	
<i>Females (n=173)</i>	105	60.7	68	39.3	173	100.0
<i>Term GPA ≥ C</i>	59	56.2	37	54.4	96	55.5
Participant (n=104)	53		9		62	
Non-Participant (n=69)	6		28		34	
<i>Unknown (n=2)</i>			2	100.0	2	100.0
<i>Term GPA ≥ C</i>			1	50.0	1	50.0
Participant (n=0)			0		0	
Non-Participant (n=2)			1		1	
<i>Persisted (n=279)</i>	173	62.0	106	38.0	279	100.0
<i>Term GPA ≥ C</i>	110	63.6	62	58.5	172	61.6
Participant (n=173)	89		20		109	
Non-Participant (n=106)	21		42		63	

interesting to see that of the minority students who did not participate in any environment, 50.0% earned the term GPA of C or better as did non-participants in the category of Pell grant status and first generation student status. With the exception of females, these three groups of non-participants demonstrated the highest percentage of any of the variables of students achieving the benchmark term GPA.

Female participants earned the term GPA of C or better at a rate of 59.6% which was the highest percentage of any of the demographic input variables. Males were the lowest in grade acquisition. Males achieved a term GPA of C or better at a rate of 37.5% overall and participation in any of the environments appeared to have had no impact. Overall, when viewing term GPA for persistence, 63.0% of the 173 participants in the environments achieved a term GPA of C or better and 61.6% of the 279 students who persisted from fall to spring earned a term GPA of C or better (Table 6).

Persistence Output

During the window of this study, full-time students at DMACC persisted fall to spring at a rate of 76.0% in 2006-07 and 75.2% in 2007-08 (DMACC Office of Institutional Effectiveness, 2008). As shown in Table 7, students from the Mandatory Placement Project persisted to the following semester at a rate of 62.8% ($n=279$). Pilot sample students persisted to the following semester at a rate of 64.1%. Control sample students persisted to the following semester at the rate of 60.9%. There was a 3.2% increase in fall to spring persistence experienced in the pilot sample over the control sample. The findings became more complex when looking beyond the pilot and control samples to students who participated in environments and students who did not. Of the 277 students who

Table 7. Persistence F-S by demographic inputs (N=444)

Variable	Pilot (n=270)		Control (n=174)		Total	
	n	%	n	%	n	%
<i>Persistence F-S</i>	173	64.1	106	60.9	279	62.8
Participant (n=277)	138		35		173	
Non-Participant (n=167)	35		71		106	
<i>White/Unknown (n=384)</i>	233	60.7	151	39.3	384	100.0
<i>Persistence F-S</i>	146	62.7	91	60.3	237	61.7
Participant (n=239)	116		30		146	
Non-Participant (n=145)	30		61		91	
<i>Minority (N=60)</i>	37	61.7	23	38.3	60	100.0
<i>Persistence F-S</i>	27	73.0	15	65.2	42	70.0
Participant (n=38)	22		5		27	
Non-Participant (n=22)	5		10		15	
<i>Pell Grant Status (n=112)</i>	71	63.4	41	36.6	112	100.0
<i>Persistence F-S</i>	48	67.6	33	80.5	81	72.3
Participant (n=74)	39		10		49	
Non-Participant (n=38)	9		23		32	
<i>First Generation (n=253)</i>	157	62.1	96	37.9	253	100.0
<i>Persistence F-S</i>	103	65.6	60	62.5	163	64.4
Participant (n=151)	83		15		98	
Non-Participant (n=102)	20		45		65	
<i>Males (n=269)</i>	165	61.3	104	38.7	269	100.0
<i>Persistence F-S</i>	100	60.6	55	52.9	155	57.6
Participant (n=173)	76		22		98	
Non-Participant (n=96)	24		33		57	
<i>Females (n=173)</i>	105	60.7	68	39.3	173	100.0
<i>Persistence F-S</i>	73	69.5	50	73.5	123	71.1
Participant (n=104)	62		13		75	
Non-Participant (n=69)	11		37		48	
<i>Unknown (n=2)</i>			2	100.0	2	100.0
<i>Persistence F-S</i>			1	50.0	1	50.0
Participant (n=0)			0		0	
Non-Participant (n=2)			1		1	
<i>Term GPA $\geq C$ (n=198)</i>	126	46.7	72	41.4	198	100.0
<i>Persistence F-S</i>	110	87.3	62	86.1	172	86.9
Participant (n=277)	89		20		109	
Non-Participant (n=167)	21		42		63	
<i>100% Credits Retained (n=254)</i>	167	65.7	87	34.3	254	100.0
<i>Persistence F-S</i>	118	70.7	61	70.1	179	70.5
Participant (n=265)	98		21		119	
Non-Participant (n=151)	20		40		60	

participated in at least one environment, 62.5% persisted to the following spring. Of the 167 students who did not participate in any environment, 69.5% persisted.

Pell grant students persisted at the highest rate (72.3%). This group of students appeared to demonstrate that participation in either the Mandatory Placement Project or any of the environments had no effect on their persistence. Of the 74 Pell grant students who participated in an environment, 66.2% persisted fall to spring compared to 84.2% of the 32 non-participating Pell grant students. Likewise, control Pell grant students from the control sample persisted at a rate of 80.5% which was 12.9% higher than Pell grant students in the pilot sample (Table 7).

Overall, 70.0% of the minorities category persisted fall to spring. Minorities appeared to benefit from participation in an environment in regards to persistence. Slightly over 71% of the minority participants who participated in an environment persisted to the following spring semester while 68.2% of the minority non-participants persisted (Table 7).

Females also persisted at a high rate. Overall, 71.1% of the female students in the study persisted fall to spring. Participation in environments also appeared to be supportive of fall-spring persistence. Over seventy percent (72.1%) of the female participants persisted to the spring semester compared to 69.9% of the females who did not participate in an environment. As in the output of Term $GPA \geq C$, males demonstrated the lowest rate of fall-spring persistence. Overall, males in the Mandatory Placement Project persisted at a rate of 57.6% and the fact that they participated in an environment had a less than positive effect on persistence. Of the 96 males who did not participate (59.4%) persisted to the following spring while 56.6% of the 173 males who participated persisted (Table 7).

The College Experience

Comparative analytics of cross tabulations and descriptive statistics were used in the study of the inputs of each of the environments. In reviewing the individual environments for comparative differences, the College Experience appeared to be among the least chosen of all of the environments by only 58 participants (13.1%) of the studied sample. A total of 49 students (18.1%) were from the pilot sample. Nine students from the control sample (5.2%) selected the course without benefit of the Mandatory Placement Project directed advising. This was the least frequently selected environment for control sample students and the third least frequently selected by pilot sample students. Forty-nine participants from the pilot sample enrolled in this option (Table 8).

The majority of the participants were traditional age students. Reviewing frequency within age categories, most of the participants ($n=56$) were traditional age students. This represents 14.1% of the 396 traditional age students and 96.6% of the participants in the environment. The College Experience appeared to hold limited appeal for the non-traditional age categories as only one out of the 34 students (2.9%) aged 25 to 35 participated and one of the 13 students (7.7%) aged 36 and above participated (Table 8).

Gender analysis indicated that 34 of the 269 identified males (12.6%) and 24 of the 173 identified females (13.9%) participated in the environment. One participant in the study was classified unknown and one gender record was missing from the data set (Table 8).

Of the 58 participants, 54 were white/unknown, 35 were first generation college students and 23 were Pell Grant recipients. What was notable in studying the ethnic makeup of this environment was the limited participation of the minority categories. Only four minority students in the study enrolled in The College Experience (Table 8).

Table 8. Demographic frequencies and outputs in the College Experience ($n=58$)

Variable	Count	Pilot ($n=270$)		Control ($n=174$)	
		Count	Percentage	Count	Percentage
<i>Participation</i>	49		18.1	9	5.2
<i>Age Categories</i>					
≤ 24 ($n=396$)	47		81.0	9	15.5
25-35 ($n=34$)	1		1.7		
≥ 36 ($n=13$)	1		1.7		
<i>White/Unknown</i> ($n=384$)					
Male ≤ 24	28		48.3	3	5.2
Female ≤ 24	17		29.3	4	6.9
Female 25-35	1		1.7		
Female ≥ 36	1		1.7		
<i>Minority</i> ($n=60$)					
Male ≤ 24	2		3.4	1	1.7
Female ≤ 24				1	1.7
<i>Pell Grant</i> ($n=112$)	21		36.2	2	3.4
<i>First Generation</i> ($n=253$)	32		55.2	3	5.2
<i>Term GPA $\geq C$</i> ($n=121$)	22		37.9	4	6.9
<i>F-S Persistence</i> ($n=173$)	32		55.1	6	10.3
<i>100% Credits Retained</i> ($n=254$)	80		58.0	6	4.3

Descriptive statistics and cross tabulations were used in studying the outputs of The College Experience environment. A total of 26 participants (44.8%) in this environment completed the term with a GPA of C or better. Twenty-two of the participants were from the pilot sample and 4 were from the control sample. Of the 49 pilot sample students who participated, almost half ended the term with a GPA of C or better. Likewise, a similar percentage of the nine control sample students achieved Term GPA $\geq C$ (Table 8).

Of the 58 participants in the environment, 65.5% persisted to the following spring semester. Thirty-two were from the pilot sample and six were from the control sample. Pilot sample participants persisted fall to spring at a rate of 65.3% compared to control sample participants who persisted at a rate of 66.7% for the environment (Table 8).

Study Strategies

During the two fall terms of the Mandatory Placement Project 138 students enrolled in the Study Strategy environment. This represented 31.2% of the sample. Ten participants were from the control sample and 128 participants were from the pilot sample. Study Strategies appeared to be a much more attractive environment than the College Experience as 47.4% of the pilot sample and 5.7% of the control sample selected this environment compared to The College Experience where 18.1% of the pilot sample and 5.2% control sample selected that environment (Table 9). For pilot sample students this was the most selected of the six environments. Both this environment and The College Experience environment were the least selected environments by students in the control sample. Directed advisement appeared to positively impact participation in these two environments.

The demographic makeup of the 138 participants in Study Strategies was similar to the College Experience environment. Within age categories 90.6% of the participants in the environment were of the traditional age of 24 and under. This represents 34.8% of the entire traditional age category. Unlike the College Experience, Study Strategies appeared to hold broader appeal for the non-traditional age students. Approximately one third of the 25-35 year olds ($n=11$) participated in this environment and two students from the 36 and older age category participated. Gender analysis indicated that 32.3% ($n=87$) of the 269 identified males and 29.5% ($n=51$) of the 173 identified females participated in the environment. One participant in the study was classified unknown and one record was missing (Table 9).

As with all of the environments the highest percentage of participation was from the white/unknown variable. Of the 138 participants in Study Strategies, 89.1% were from this

Table 9. Demographic frequencies and outputs in Study Strategies ($n=138$)

Variable	Count	Pilot ($n=270$)		Control ($n=174$)	
		Count	Percentage	Count	Percentage
<i>Participation</i>	128		47.4	10	5.7
<i>Age Categories</i>					
≤ 24 ($n=396$)	115		83.3	10	7.2
25-35 ($n=34$)	11		8.0		
≥ 36 ($n=13$)	2				
<i>White/Unknown</i> ($n=384$)					
Male ≤ 24	66		47.8	5	3.6
Male 25-35	5		3.6		
Male ≥ 36	1		0.7		
Female ≤ 24	35		25.4	4	2.9
Female 25-35	6		4.3		
Female ≥ 36	1		0.7		
<i>Minority</i> ($n=60$)					
Male ≤ 24	9		6.5	1	0.7
Female ≤ 24	5		3.6		
<i>Pell Grant</i> ($n=112$)	41		29.7	2	1.4
<i>First Generation</i> ($n=253$)	68		49.3	4	2.9
<i>Term GPA $\geq C$</i> ($n=121$)	48		34.7	2	1.4
<i>F-S Persistence</i> ($n=173$)	78		56.5	4	2.9
<i>100% Credits Retained</i> ($n=254$)	80		58.0	6	4.3

category. The more notable factor was that 15 students or one quarter of the minority students participated in the Study Strategy environment. All 15 of them were from the traditional age category of 24 and under. A little over half (52.5%) were first generation college students and a third (31.2%) were Pell Grant recipients (Table 9).

Descriptive statistics and cross tabulations were used to examine the outputs of the Study Strategies environment. There were 128 students from the pilot sample and ten from

the control sample who participated. Overall, 50 participants (36.2%) in the environment ended the term with a GPA of C or better. Forty-eight (37.5%) of the pilot sample participants and 20% of the control sample ($n=2$) completed the term with a GPA of C or above (Table 9).

There were a total of 82 participants in Study Strategies that persisted fall to spring between the two samples studied. Of the 128 students from the pilot sample who participated 60.9% ($n=78$) persisted to the following semester while 40% of the 10 control sample participants persisted (Table 9).

Learning Communities

Over the course of the Mandatory Placement Project, 135 students (30.4%) participated in the Learning Community environment. As shown in Table 10, 118 students (43.7%) were from the pilot sample and 17 (9.8%) were from the control sample. Outside of the College Prep Math environment, this was the most frequently selected environment by control sample students and was the second most frequently selected environment by students from the pilot sample.

Of the 135 participants in the Learning Communities, 122 (90.4%) were classified as traditional age. This represented 30.8% of all the traditional aged students in the study. Eleven of the students (32.4%) in the 25-35 year old category participated and two students (15.4%) in the 36 and above age category participated. Learning Communities and Study Strategies appeared to hold similar appeal for the non-traditional age categories (Table 10).

Table 10. Demographic frequencies and outputs in Learning Communities ($n=135$)

Variable	Pilot ($n=270$)		Control ($n=174$)	
	Count	Percentage	Count	Percentage
<i>Participation</i>	118	43.7	17	9.8
<i>Age Categories</i>				
≤ 24 ($n=396$)	106	78.5	16	11.9
25-35 ($n=34$)	10	7.4	1	0.8
≥ 36 ($n=13$)	2	1.5		
<i>White/Unknown</i> ($n=384$)	107	79.3	14	10.4
Male ≤ 24	62	45.9	10	7.4
Male 25-35	4	3.0		
Male ≥ 36	1	0.8		
Female ≤ 24	34	25.2	3	2.2
Female 25-35	5	3.7	1	0.8
Female ≥ 36	1	0.8		
<i>Minority</i> ($n=60$)	11	8.1	3	2.2
Male ≤ 24	7	5.2	2	1.5
Female ≤ 24	3	2.2	1	0.8
Female 25-35	1	0.8		
<i>Pell Grant</i> ($n=112$)	37	27.4	7	5.2
<i>First Generation</i> ($n=253$)	70	51.9	7	5.2
<i>Term GPA $\geq C$</i> ($n=121$)	50	37.0	5	3.7
<i>F-S Persistence</i> ($n=173$)	81	58.7	12	8.9
<i>100% Credits Retained</i> ($n=254$)	79	58.5	9	6.7

Of the participants, 57.0% were first generation college students and 32.6% were Pell Grant recipients. A total of 117 (30.5%) of all the white/unknown students in the study participated. Fourteen minority students enrolled in a Learning Community environment compared to 15 in Study Strategies and only four in the College Experience. While the numbers were small ($n=3$) more control sample minorities selected this environment than the other two (The College Experience and Study Strategies). Gender analysis indicated that 86 males and 49 females participated in the environment. This was similar to the gender split in Study Strategies (87 males, 51 females). The College Experience environment demonstrated

a slightly higher percentage of female (41.4%) participation than either of the other two environments (Table 8).

Descriptive statistics and cross tabulations were used in studying the outputs of the Learning Community environment. Fifty of the 118 pilot sample students (42.4%) completed the term with a GPA of C or above. Five of the 17 control students (29.4%) who participated in a Learning Community completed the term with a GPA of C or above (Table 10).

Overall, 93 participants (68.9%) in the learning community environment persisted to the following spring term. Eighty-one of the students (68.8%) were from the pilot sample ($n=118$) and 12 students (70.6%) from the control sample ($n=17$) (Table 10.).

College Preparatory Environments Assessment

ACT and COMPASS were the entrance assessments provided by the studied sample for enrollment. The data reflected assessment scores in ACT English, Reading and Math and COMPASS scores in Writing, Reading and Math. There were 162 ACT scores provided in the data equally in the areas of English, Reading and Math. There were 298 COMPASS Math scores, 293 COMPASS English scores and 286 COMPASS Reading scores. Individual ACT and COMPASS scores provided in the data reflected duplicate assessments for entering students. Students providing ACT assessment scores below 19 in any of the three core skill areas were requested to take an additional COMPASS assessment. Overall, one-third of the ACT scores provided fell below the identified cut score. These students were required to take an additional COMPASS assessment in one or more areas. In addition, full-time students who did not provide ACT records were required to take COMPASS assessment tests. As students who provided ACT assessment scores had the potential of also providing

COMPASS scores, all of the assessment scores were combined by the researcher to provide reading, writing and math cut scores.

COMPASS assessment scores ranged from 1-99. ACT scores ranged from 1-36. DMACC determined that the cut scores for recommended College Preparatory Reading courses as COMPASS Reading scores <81 or ACT Reading scores <19 . Recommended placement in College Preparatory Writing was suggested for students who scored <70 in COMPASS Writing or <19 in ACT English. Students who assessed <76 in COMPASS Math or <19 in ACT Math were encouraged to enroll in College Preparatory Math.

The Mandatory Placement Project under study directed students scoring below the cut scores for ACT or COMPASS assessment in Reading, English or Math to enroll in at least two course environments which were limited to The College Experience, Study Strategies or any of the College Prep Reading, Writing, or Math environments. There were several developmental Learning Community options provided.

There were 162 ACT assessment scores provided in Reading. The mean ACT Reading score was $\mu = 21.54$, with a range of 11 to 36. A total of 51 scores were <19 . There were a total of 286 COMPASS assessment scores provided. The college identified COMPASS Reading cut score as all scores falling <81 . The mean score for the students who tested was $\mu = 79.76$, with a range of 25 to 99. A total of 125 scores were <81 . The researcher used both ACT and COMPASS for each student regardless of test to determine whether they met the cut scores established by DMACC (Table 3). A total of 401 students from the studied sample provided reading assessments. Forty-three students were missing reading assessment data. Of the 401 students providing reading assessment scores, 33.4% indicated need for College Prep Reading.

Similarly of the 162 ACT English scores provided, the mean score was $\mu = 20.23$, ranging from a low of 8 to a high of 34. A total of 57 ACT scores were <19 . There were 293 assessment scores provided for COMPASS Writing. The established cut score was <70 and the mean score for testers was $\mu = 66.94$. The range in scores was 5 to 99. A total of 119 COMPASS writing scores fell <70 . The researcher combined both ACT and COMPASS assessment cut scores for the sample to facilitate an analysis of students and account for the duplicated assessments (Table 3). A total of 402 students provided writing assessments to the college. The data reflected that 42 students were missing writing assessment records. Of the 402 students providing writing scores 31.6% indicated need for College Preparatory Writing.

There were 162 ACT assessment scores provided in both ACT Math. Of the math scores provided, the mean was $\mu = 20.93$; the range was 14 to 34. A total of 53 scores were <19 . COMPASS Math assessment data provided 298 scores. The established cut score for math was <76 . The minimum score was 17 and the maximum score was 99. Of the 298 COMPASS Math assessment scores, 242 were <76 . The mean score was significantly lower at $\mu = 52.05$. It was significant to notice both the wide disparity between the COMPASS Math cut score and the mean assessment score as well as the significant percentage of assessments that fell below the cut score. The researcher combined both ACT and COMPASS assessment cut scores for the sample to facilitate an analysis of students and account for the duplicated assessments (Table 3). A total of 406 students in the project study provided math assessments with 38 students not providing scores. Of the 406 student assessments provided for math 60.1% demonstrated need for College Preparatory Math.

Reading

Analysis of participation from the studied sample provided that while a combined 134 student assessment scores demonstrated need for College Prep Reading only 44 students in the study participated. The 44 enrollments in College Prep Reading consisted of 31 students from the pilot sample and 13 students from the control sample.

Demographic analysis within the environment indicated that of the students who enrolled in College Prep Reading, 68.2% were white/unknown and 31.8% were minority. Minority participation increased substantially in this environment. Minority participants made up a small percentage of the enrollments in the College Experience (6.9%), Study Strategies (10.9%) and Learning Communities (10.4%). While the actual numbers were not strikingly high ($n=14$) the percentage change reflected fewer white/unknown students participating in College Prep Reading than in the other discussed environments.

First generation college students ($n=19$) comprised 43.1% or almost half of the participants. Twelve Pell Grant recipients (27.2%) participated. Gender analysis indicated that there were 23 males and 21 females enrolled (Table 11).

A total of 125 students from the traditional age category assessed below the identified cut scores for reading. Yet, only 36 of the identified students (28.8%) in this age category participated. Three students from this age category who participated scored above the cut score. College Prep Reading appeared to be equally limited in appeal to the non-traditional age categories. There were a total of 34 students aged 25 to 35 in this study. Six of them assessed below the cut score and two participated in the environment. In addition, one 25 to 35 year old scored above the cut score and still enrolled in the College Prep Reading environment. Likewise, of the 13 students 36 and over, three assessment scores demonstrated

Table 11. Demographic frequencies and outputs in College Prep Reading ($n=44$)

Variable	Count	Pilot	Count	Control
		($n=270$)		($n=174$)
		Percentage		Percentage
<i>Participation</i>	31	11.5	13	7.5
<i>Age Categories</i>				
≤ 24 ($n=396$)	25	56.8	13	29.5
25-35 ($n=34$)	4	9.1		
≥ 36 ($n=13$)	1	2.3		
Unknown ($n=1$)	1	2.3		
<i>White/Unknown</i> ($n=384$)	19	43.2	11	25.0
Male ≤ 24	7	15.9	8	18.2
Male ≥ 36	1	2.3		
Female ≤ 24	7	15.9	3	6.8
Female 25-35	3	6.8		
Unknown age category	1	2.3		
<i>Minority</i> ($n=60$)	12	27.3	2	4.5
Male ≤ 24	6	13.6	1	2.3
Female ≤ 24	5	11.4	1	2.3
Female 25-35	1	2.3		
<i>Pell Grant</i> ($n=112$)	10	22.7	2	4.5
<i>First Generation</i> ($n=253$)	15	34.1	4	9.1
<i>Term GPA $\geq C$</i> ($n=121$)	14	31.8	1	2.3
<i>F-S Persistence</i> ($n=173$)	23	52.3	7	15.9
<i>100% Credits Retained</i> ($n=254$)	21	47.7	7	15.9

need and yet only one participated. No students scoring above the cut score in this age category participated in the College Prep Reading environment (Table 11).

Gender distribution was fairly equally divided between the 125 traditional aged students who assessed below the reading cut score. There were 72 males who scored below the cut score and 27.8% ($n=20$) participated. There were 53 females who scored below the cut score and 30.2% ($n=16$) participated. In addition, two males and one female assessed above the cut score and participated in the course environment. In the 25-34 age category, two females scored below the cut score and both of them (100%) participated in the College

Prep Reading environment. One additional female who assessed above the cut score participated. In that same 25-34 age category there were four males identified and none of them participated. For the age category of 36 and above, two males assessed below the cut score and one participated. One female assessed below the cut score and did not participate (Table 11).

The researcher used descriptive statistics and cross tabulations in studying the outputs of the College Prep Reading environment. There were a total of 31 students from the pilot sample who participated. Of those 31 participants 45.2% completed the term with a GPA of C or better. In the control sample with 13 participants, one student (7.7%) earned a GPA C or above at the end of the term (Table 11).

Overall, 30 of the 44 participants (68.1%) in the College Prep Reading environment persisted fall to spring. Of the 31 students from the pilot sample who participated in the College Prep Reading environment 74.2% ($n=23$) persisted to the following semester. Of the students from the control sample who participated 53.8% ($n=7$) persisted to the following semester (Table 11). Students from the pilot sample who participated appeared to persist at the highest rate.

Writing

A total of 402 students provided writing assessments to the college. As shown in Table 12, the data reflected that 42 students were missing writing assessment records. While assessment scores identified 127 students (28.6% of the sample) as benefiting from developmental writing coursework, only 43 students participated in College Prep Writing.

Table 12. Demographic frequencies in College Prep Writing ($n=43$)

Variable	Pilot ($n=270$)		Control ($n=174$)	
	Count	Percentage	Count	Percentage
<i>Participation</i>	32	11.9	11	6.3
<i>Ag Categories</i>				
≤ 24 ($n=396$)	27	62.8	8	18.6
25-35 ($n=34$)	3	7.0	2	4.7
≥ 36 ($n=13$)	2	4.7	1	2.3
<i>White/Unknown</i> ($n=384$)	20	46.5	7	16.3
Male ≤ 24	7	16.3	3	7.0
Male ≥ 36	1	2.3	1	2.3
Female ≤ 24	9	20.9	2	4.7
Female 25-35	2	4.7	1	2.3
Female ≥ 36	1	2.3		
<i>Minority</i> ($n=60$)	12	27.9	4	9.3
Male ≤ 24	6	14.0	1	2.3
Male ≥ 36			1	2.3
Female ≤ 24	5	11.6	2	4.7
Female 25-35	1	2.3		
<i>Pell Grant</i> ($n=112$)	9	20.9	2	4.7
<i>First Generation</i> ($n=253$)	19	44.2	3	7.0
<i>Term GPA $\geq C$</i> ($n=121$)	14	32.9	0	0.0
<i>F-S Persistence</i> ($n=173$)	23	53.5	6	14.0
<i>100% Credits Retained</i> ($n=254$)	21	48.8	2	4.7

Analysis of participation from the sample provided that the 43 enrollments in College Prep Writing consisted of 32 participants (11.9%) from the pilot sample and 11 participants (6.3%) from the control sample. Demographic analysis within the environment indicated that of the students who enrolled in College Prep Writing, 62.8% were white/unknown and 37.2% were minority. Like College Prep Reading, while the actual minority numbers were not strikingly high ($n=16$) the percentage change reflects fewer white/unknown students participating in College Prep Writing than in the other discussed environments (Table 12).

First generation college students ($n=22$) comprised 51.2% of the participants. Pell Grant recipients ($n=11$) comprised 25.6%. Participants from the pilot sample made up 74.4% of the environment. The control sample made up the remaining 25.6% of the environment. Gender analysis indicated that there were 20 males and 23 females enrolled. This is the first and only environment that females outnumbered the males (Table 12).

Again, the majority of the participants fell in the traditional age range. A total of 114 students in the traditional age category assessed below the identified cut scores for writing. Of those students only 35 participated (30.7%). In addition, one traditional aged student scored above the established cut score yet participated in the College Prep Writing environment. The development course environment appeared to be somewhat more appealing to the non-traditional age categories. With a total of 34 students aged 25 to 35 in this study eight (23.5%) assessed below the cut score and three (37.5%) participated. No students scoring above the cut score in this age category chose to participate. Likewise, of the 13 students from the Mandatory Placement Project who were 36 and above, five students (38.5%) demonstrated need and three (60%) participated. Again, no students 36 and above who scored above the cut score participated (Table 12).

Gender disbursement for the College Prep Writing environment was noted. There were 80 males who assessed below the cut score. A total of 20 males participated. In the traditional age variable 72 males scored below the cut score and 23.6% ($n=17$) participated. In addition in this age group one male assessed above the cut score and yet chose to participate in the course environment. In the 25-34 age category, five males fell below the cut score and none participated. For the 36 and above age category a total of three males fell below the cut score and two (66.7%) participated (Table 12).

Overall there were 47 females who scored below the cut score for writing. In total 23 females participated in College Prep Writing. There were 42 females in the traditional age category who scored below the cut score and 42.9% ($n=18$) participated. In the 25-34 age category there were three females who scored below the cut score and all three (100%) participated in the course environment. One female scored above the cut score and participated. One of the two identified females (50%) in the 36 and above age category participated (Table 12).

In studying the outputs of the College Prep Writing environment, overall, 14 participants (32.6%) in the College Prep Writing environment achieved the Term GPA $\geq C$. All of the 14 were from the 32 participants in the pilot sample. None of the 11 participants from the control sample achieved the Term GPA $\geq C$ (Table 12).

Overall, a total of 29 participants (67.4%) in this environment persisted to the following spring term. Of the 32 students from the pilot sample who participated in the College Prep Writing environment 71.9% ($n=23$) persisted to the following semester. While none of the students in the control sample achieved a passing grade for this course, of the 11 who participated, 54.5% ($n=6$) persisted to the following semester (Table 12).

Math

Of the 406 student assessments provided for math, 244 students (60.1%) demonstrated need for College Preparatory Math (Table 13). Unlike the College Prep Reading and College Prep Writing environments students in both the pilot and control samples appeared to be most receptive to enrollment in this environment. Participants from the pilot sample made up 75.7% of the environment. The control sample made up the

Table 13. Demographic frequencies and outputs in College Prep Math ($n=140$)

Variable	Pilot ($n=270$)		Control ($n=174$)	
	Count	Percentage	Count	Percentage
<i>Participation</i>	106	39.3	34	19.5
<i>Age Categories</i>				
≤ 24 ($n=396$)	96	68.6	29	20.7
25-35 ($n=34$)	9	6.4	4	2.9
≥ 36 ($n=13$)	1	0.7	1	0.7
<i>White/Unknown</i> ($n=384$)				
Male ≤ 24	49	35.0	20	14.3
Male 25-35	3	2.1	1	0.7
Male ≥ 36	1	0.7	1	0.7
Female ≤ 24	27	19.3	6	4.3
Female 25-35	5	3.6	2	1.4
<i>Minority</i> ($n=60$)				
Male ≤ 24	12	8.6	3	2.1
Female ≤ 24	8	5.7		
Female 25-35	1	0.7	1	0.7
<i>Pell Grant</i> ($n=112$)				
	23	16.4	9	6.4
<i>First Generation</i> ($n=253$)				
	64	45.7	15	10.7
<i>Term GPA $\geq C$</i> ($n=121$)				
	38	27.1	12	8.6
<i>F-S Persistence</i> ($n=173$)				
	65	46.4	19	13.6
<i>100% Credits Retained</i> ($n=254$)				
	62	44.3	19	13.6

remaining 24.3% of the environment. Of the identified students assessing below the cut score, a total of 106 (43.4%) participated in the developmental math coursework. Of the 140 students participating in the environment, 33 scored above the cut score yet still enrolled. One participant assessment record was missing.

First generation college students ($n=79$) comprised 56.4% of the participants. Pell Grant recipients ($n=32$) comprised 22.9% of the participants. Gender analysis indicated that there were 90 males and 50 females enrolled (Table 13).

In all age categories, there were 135 males who scored below the cut score and 60 who participated. In addition, 30 males who assessed above the cut score also participated in

the College Prep Math environment. Of the traditional age students there were 123 males who scored below the cut score and 57 who participated (46.3%). Twenty-six male students scored above the cut score and still participated. In addition one male student with invalid cut score data participated in the course environment. In the 25-34 age category, there were eight males who scored below the cut and two participated (25.0%). In addition, two males who assessed above the cut score also participated in the environment. Four males who were 36 and older assessed below the cut score and only one participated. One additional male who exceeded the assessment cut score participated in the environment (Table 13).

Overall, there were 109 females who scored below the cut score. No females older than 24 assessed above the math cut score. Ninety-three of the traditional age females who participated in the College Prep Math environment scored below the cut score and 46 participated (49.5%). Four female students assessed above the cut score and yet participated. In the 25-36 year old category 12 females assessed below the cut score and nine participated (75.0%). No females in this age category assessed above the cut score. In the 36 and above age category four females scored below the cut score and none participated. Again, in this age category there were no females who assessed above the identified math cut score (Table 13).

The numbers of students demonstrating remedial need in the area of math were significantly higher than in the areas of reading and writing. Likewise the willingness to participate in the environment appeared higher. As a whole, students appeared to be much more cognizant of need in math support and when comparing the individual environments these students appeared much more receptive to utilizing college developmental resources in that area.

This environment had the highest participation of any of the developmental environments in the study as well as any of the six environments. In analyzing race demographics in the area of participation it was notable to the researcher that of the 140 students enrolled in College Prep Math, minorities ($n=25$) comprised 17.9% of the participants within the environment. College Prep Reading demonstrated 31.8% within environment participation and College Prep Writing demonstrated 17.9% participation within the environment. Overall far more minority students participated in the developmental environments than any of the other options. This is the only college prep environment where the white/unknown group demonstrated a stronger proclivity towards participation. More minorities ($n=25$) participated in this environment than in any of the six provided in the project. Due to the high number of white/unknown participating, the percentage of minority participation dropped. Slightly more than two thirds (42%) of the minorities in the project participated in College Prep Math (Table 13).

Descriptive statistics and cross tabulations were used when analyzing the outputs of the College Prep Math environment. Overall, 50 (35.7%) of the participants achieved a term GPA of C or above. Thirty-eight (35.8%) of the 106 participants from the pilot sample completed the term with a GPA of C or above. Twelve (35.3%) of the 34 control participants in this environment achieved a term GPA of C or better (Table 13).

A total of 84 participants (60.0%) in the College Prep Math environment persisted from fall to spring term. Of the 106 students from the pilot sample 61.3% ($n=65$) persisted to the following semester. Of the 34 students from the control sample 55.9% ($n=19$) persisted to the following semester (Table 13).

Participation Outputs

Analyses of participation for the studied sample indicated that a total of 277 students participated ($n=217$ pilot sample, $n=60$ control sample) in at least one of the supported environments. Of the 277 participants 43.7% ended the fall term with a GPA of C or better, 61% retained 100% of their course credits and 62.5% persisted to the following spring semester. There were 171 students who retained all of their course credits from the participant category. Of those students 69.6% persisted to the following spring semester. Deeper analysis of the term end GPAs demonstrated that 90.1% of the 121 students who attained a term GPA of C or better persisted fall-spring (Table 14).

Table 14. Participation and persistence ($N=444$)

Variable	Participant ($n=277$)		Non-Participant ($n=167$)	
	n	%	n	%
<i>100% Credits Retained</i>	171	61.0	83	49.7
F-S Persistence	119	69.6	60	72.3
<i>Term GPA $\geq C$</i>	121	43.7	74	44.3
F-S Persistence	109	90.1	62	83.8
<i>F-S Persistence</i>	173	62.5	106	63.5

One hundred sixty-seven students did not participate ($n=53$ pilot sample, $n=114$ control sample). Of the students who did not participate in any environment, 44.3% finished the term with a GPA of C or better, 49.7% retained 100% of their course credits and 63.5% persisted to the following spring term. Reviewing persistence rates for the 83 students who retained all course credits, 72.3% persisted to the following spring. Deeper analysis of the term end GPAs demonstrated that 83.8% of the 74 students who earned a GPA of C or better persisted fall to spring. While credit retention for participants was higher than non-

participants their persistence was lower. Participants demonstrated a 12% higher rate of credit retention over non-participants during the term. Participants were similar in terms of earning a GPA of C or better demonstrating less than 1% lower than non-participants. While participants earned a GPA of C or better at a slightly lower rate than non-participants they did persist at a higher rate (Table 14).

Multivariate

This research focused on fall-spring persistence of students in the studied sample. Inferential statistical procedures of Pearson correlation and blocked multiple regression were employed to test the hypotheses and study the predictability of any of the variables in persistence from fall to spring. Pearson correlation was employed to identify significant correlations between the independent variables and the dependent variable of fall-spring persistence. Multiple regression using the enter method was used in the block regression to observe changes in significance in relationships of the variables between the models. The conceptual I-E-O model of Astin (1993) was used in the regression to make sense of the data. A significance level of $p < .05$ was set to study the significance.

The variables used for this study included demographic input factors of gender, age categories, race, sample groups, first generation status, Pell grant status and participation as well as the environmental factors of the College Experience, Study Strategies, Learning Communities, College Prep Reading, College Prep Writing and College Prep Math. The output performance characteristic variables of 100% credits retained and term $GPA \geq C$ and fall-spring persistence were also studied.

There were three major questions that the researcher addressed in this study. The performance characteristic of fall-spring persistence was designated as the dependent variable and the focus of the analysis. The questions that the research focused on were:

1. Do any of the demographic factors of ace, gender, age, first generation Pell grant status, participation, and pilot or control have an effect on the fall-spring persistence of late registrants?
2. Does participation in any of the first semester college course environments by late registrants have an effect on fall-spring persistence for late registrants?
3. Do any of the performance characteristics have an effect on fall-spring persistence for late registrants?

Null Hypotheses

Null hypotheses were developed for each of the questions to identify if any of the independent variables of input, environment or output in the project study demonstrated any statistically significant relationships with the dependent variable of fall-spring persistence. As the hypothesis of this study was based on the premise that there was an effect between the Mandatory Placement Project treatment for late registrants and fall-spring persistence the following questions were used to test for the null hypotheses:

- NH1. None of the seven demographic input variables of gender, age categories, race, first generation student status, Pell grant recipient status, participation or sample groups of pilot versus control have an effect on fall-spring persistence for late registrants.
- NH2. Participation in environment variables of the College Experience, Study Strategies, Learning Communities, College Prep Reading, College Prep Writing and or College

Prep Math courses by late registrants has no effect on fall-spring persistence for late registrants.

NH3. The output variables or performance characteristics of 100% credits retained or term GPA \geq C have no effect on fall-spring persistence for late registrants.

Analytics of bivariate correlation were conducted on the variables of input, environment, and output to measure the size and directions of associations between the 16 independent variables of this study and the dependent variable of student persistence fall to spring. The variables were considered using the framework of Astin's I-E-O model. The input variables studied were first generation status, Pell grant status, race, age categories, sample groups, gender, and participation. The environment variables were The College Experience, Study Strategies, Learning Communities, College Prep Reading, College Prep Writing, and College Prep Math. The output variables were 100% credits retained and term GPA \geq C.

Pearson correlation analysis was conducted with the researcher accepting a significance level set at $p < .05$. This level of significance allowed for a less than 5% chance (5 chances out of 100) of a relationship occurring due to chance with the variables. Pearson correlation analysis identified that out of the input variables of gender, age categories, race, first generation status, Pell grant status, sample groups and participation there was a significant positive correlation at the $p < .05$ one-tail level in persistence relative to gender ($r = .129$, $p < .001$, $N = 444$) and Pell grant ($r = .114$, $p = .01$, $N = 444$) both with a correlation significant at a more stringent $p < .01$ one-tail level. These variables met a more stringent level of significance allowing for less than 1 chance out of 100 that the relationship occurred due to chance. Within the independent variables of the studied environments, only the Learning

Community environment ($r=.083, p=.04, N=444$) demonstrated a correlation significant at the $p<.05$ one-tail level. Conducting the same analysis on the output variables of term GPA \geq C and 100% credits retained, data indicated that there was a significant positive correlation in term GPA \geq C ($r=.489, p<.001, N=444$) and 100% credits retained ($r=.228, p<.001, N=444$) (Table 15).

While Pearson correlation identified positive linear correlated associations between the variables of persistence and gender, Pell grant, Learning Communities, term GPA \geq C and 100% credits retained a block regression analysis was conducted in order to study the predictive measures of each of the I-E-O variables on student persistence. The regression was conducted using the standard (enter) method with fall-spring persistence as the dependent variable. The standard method was selected as the researcher wanted all of the predictor

Table 15. Pearson correlations of independent variables with F-S persistence ($N=444$)

Variable	Correlation	Sig. (1 -tailed)
<i>Inputs</i>		
Gender	.13	<.001*
Age Categories	-.01	.43
Race	.01	.45
First Generation	.04	.21
Pell Grant	.11	.01*
Participated	-.01	.42
Sample Groups	-.03	.25
<i>Environments</i>		
The College Experience	.02	.33
Study Strategies	-.05	.16
Learning Communities	.08	.04**
College Prep Reading	.04	.22
College Prep Writing	.03	.26
College Prep Math	-.04	.20
<i>Outputs</i>		
Credit Course Retention	.23	<.001*
Term GPA	.49	<.001*

* Significant at the 0.01 level (1-tailed).

** Significant at the 0.05 level (1-tailed).

variables entered into the equation in sets with each variable being individually analyzed. The standard method allowed for analysis of the individual contributions of each variable in combination with the others.

The independent variables were sorted into three blocks reflecting inputs (Model 1), environments (Model 2) and outputs (Model 3). Model 1 included seven independent variables: gender, age categories, race, first generation, Pell grant, participation, and sample groups. Model 2 encompassed the seven variables of input as well as the six variables of environment: The College Experience, Study Strategies, Learning Communities, College Prep Reading, College Prep Writing and College Prep Math. Model 3 contained all seven input variables, six environment variables, and added the two remaining output variables of term GPA \geq C and 100% credits retained provided in the study. SPSS regression was used to evaluate the variables (Table 16).

Under the standard method of multiple regression the models were tested with all requested variables entered and no variables removed. The multiple R for Model 3 ($R=.51$, $p<.001$, $p<.01$) demonstrated a moderate correlation between the 15 predictor variables and the dependent variable of fall-spring persistence. ANOVA analytics identified that the significance level of Model 3 in the summary of analysis of variance for regression was $F = 10.21$, $p<.01$. The R^2 value indicated that 26.4% of the variance in fall-spring persistence could be explained by the predictor variables (Table 17).

Further analysis of the Standard Coefficients within the models provided the relative influence of the entered variables. In Model 1, the variables gender ($\beta=.12$, $p=.01$) and Pell grant status ($\beta=.11$, $p=.02$) demonstrated the greatest influence of the seven independent

Table 16. Summary of multiple block regression ($N=444$)

Variable	β	t	Sig.
<i>Model 1</i>			
F-S Persistence (Constant)		2.29	.02**
Gender	.12	2.57	.01*
Age Categories	-.02	-.40	.69
Race	.00	-.05	.96
First Generation	.05	1.01	.31
Pell Grant	.11	2.33	.02**
* Participated	-.03	-.48	.64
Sample Groups	-.04	-.76	.45
<i>Model 2</i>			
F-S Persistence (Constant)		1.90	.06
Gender	.12	2.49	.02**
Age Categories	-.02	-.43	.67
Race	-.01	-.19	.85
First Generation	.04	.92	.36
Pell Grant	.11	2.16	.03**
Participated	-.02	-.31	.76
Sample Groups	-.05	-.87	.39
The College Experience	-.01	-.05	.96
Study Strategies	-.10	-1.68	.09
Learning Communities	.12	2.06	.04**
College Prep Reading	.04	.60	.55
College Prep Writing	.02	.26	.79
College Prep Math	-.05	-.91	.37
<i>Model 3</i>			
F-S Persistence (Constant)		1.46	.15
Gender	.03	.78	.44
Age Categories	-.04	-.97	.33
Race	.01	.25	.81
First Generation	.00	.03	.97
Pell Grant	.10	2.23	.03**
Participated	-.04	-.61	.54
Sample Groups	.02	.37	.71
The College Experience	.00	-.03	.98
Study Strategies	-.04	-.84	.40
Learning Communities	.10	1.89	.06
College Prep Reading	.01	.17	.87
College Prep Writing	.04	.64	.53
College Prep Math	.00	.04	.97
% Crdts Retained	.07	1.57	.12
Term GPA	.45	9.92	<.001*

Note: β represents the standardized regression parameter estimates.

* Significant at the 0.01 level (1-tailed); ** Significant at the 0.05 level (1-tailed).

Table 17. Model summary for multiple block regression ($N=444$)

	<i>R</i>	<i>R</i> ²	<i>Adjusted R</i> ²	<i>Sig.</i>
<i>Model 1</i>	0.18	.03	.02	
<i>Regression</i>				.05**
<i>Model 2</i>	0.22	.05	.02	
<i>Regression</i>				.06
<i>Model 3</i>	0.51	.26	.24	
<i>Regression</i>				.00*

* Significant at the 0.01 level (1-tailed); ** Significant at the 0.05 level (1-tailed).

variables. After entering the environment variables in Model 2 gender ($\beta=.12, p=.01$) and Pell grant status ($\beta=.11, p=.03$) continued to demonstrate significant influence with the significance level set at $p<.05$. In addition, the environment of Learning Communities ($\beta=.12, p=.04$) also demonstrated significant influence. In Model 3 the variable Pell grant status ($\beta=.10, p=.03$) and term GPA $\geq C$ ($\beta=.45, p<.001$) demonstrated significant influence on the dependent variable fall-spring persistence while gender ($\beta=.03, p=.44$) did not meet the established significance level of $p<.05$ and became less of a predictive factor. Likewise, the environmental variable of Learning Communities ($\beta=.10, p=.06$) no longer met the established significance level (Table 17).

While the output variable 100 % credits retained was significant in Pearson correlation analytics and in the regression it correlated with fall-spring persistence ($r=.23$) it did not provide significant influence on the dependent variable within Model 3 ($\beta=.07, p=.12$). Of all the variables studied, the standardized coefficient of term GPA $\geq C$ contributed the most predictive strength towards fall-spring persistence (Table 17).

Research Question 1

1. *Do any of the demographic factors of race, gender, age, first generation Pell grant status, participation, and pilot or control have an effect on the fall-spring persistence of late registrants?*

Pearson correlation analysis indicated that gender ($r=.13$, $p<.01$ one-tailed) and Pell grant status ($r=.11$, $p<.01$ one-tailed) demonstrated a statistically significant positive correlation with persistence from fall to spring. The variables were significant at the $p<.01$ level employing bivariate correlation studies (Table 15). The two independent variables retained their significance, though at a lower level, in Model 1 of the block regression analysis (Table 16). Age categories, race, first generation, participation and sample groups demonstrated no significant effect.

The Model 1 regression analytics demonstrated significance with $p = .05$. This met the significance level of $p<.05$ established for the study. The null hypotheses tested for the research question was negated. In fact several of the seven demographic input variables of gender, age categories, race, first generation student status, Pell grant recipient status, participation or sample groups had a positive effect on fall–spring persistence for late registrants. The adjusted coefficient of multiple determination of Model 1 (adjusted $R^2=.02$) however, indicated that the relationships of the variables in the model were weak (Table 17).

Research Question 2

2. *Does participation in any of the first semester college course environments by late registrants have an effect on fall-spring persistence for late registrants?*

Pearson correlation analysis indicated that Learning Communities ($r=.08$, $p=.04$) demonstrated a statistically significant linear positive correlation with persistence from fall to spring. The variable was significant at the $p<.05$ level employing bivariate correlation studies

(Table 15). No other environment demonstrated significant linear correlations. The Learning Community variable retained its significance in Model 2. The input variables of gender ($p=.02$) and Pell grant status ($p=.03$) also retained significance though at a lower level in Model 2 of the block regression analysis (Table 16). The College Experience, Study Strategies, College Prep Reading, College Prep Writing and College Prep Math demonstrated no significant correlation.

The Model 2 regression analytics demonstrated a significance of $p=.06$ and did not meet the significance level established for the study. The findings supported the null hypotheses tested for the research question. Participation in environment variables of The College Experience, Study Strategies, Learning Communities, College Prep Reading, College Prep Writing and or College Prep Math courses by late registrants has no effect on fall-spring persistence for late registrants (Table 17).

Research Question 3

- 3. Do any of the performance characteristics have an effect on fall-spring persistence for late registrants?*

Pearson Correlation analysis indicated that 100% credits retained ($r=.23, p=.00$) and term $GPA \geq C$ ($r=.49, p<.001$) demonstrated statistically significant positive linear correlations with fall-spring persistence. The variables were significant at the $p<.01$ level employing bivariate correlation studies (Table 15). The two independent variables did not retain their significance at in Model 3 of the block regression analysis (Table 16). The variable 100% credits retained changed to a significance level of $p=.12$ and no longer met the significance level set for the study.

The Model 3 regression analytics demonstrated significance ($p < .001$) met the significance level of $p < .05$ established for the study. The null hypotheses tested for the research question was negated. In fact the output variables or performance characteristics of 100% credits retained or term $GPA \geq C$ have a positive effect on fall-spring persistence for late registrants. The adjusted coefficient of multiple determination of Model 3 (adjusted $R^2 = .24$) indicated that the relationships of the variables in the model were able to be explained 24% percent of the time (Table 17).

Summary

This chapter described the data analyses for the research questions that framed the study. The chapter was structured to first readdress the purpose of the study and then organized into three parts. The first part provided a descriptive statistic analysis to explore the sample for the input variables, environment variables and the output variables. Part two of the chapter provided an in-depth descriptive analysis exploring each of the environments using the input and output variables. The third and final part of the chapter focused on a multivariate analysis to study the influence and predictability of the variables and answer the questions posed in the study.

Two of the three hypotheses were tested for the null and predictive analytics were able to refute them. The hypothesis of environment having a predictive effect was not able to be proven with this study. Even so, the variable of Learning Communities was able to demonstrate a positive linear correlation with the variable of fall-spring persistence for late registrants. Overall the block regression model 3 which included all the variables of input, environment and output was able to explain (with 24% of the variance being accounted for)

the predictability of a relationship between the independent variables and fall–spring persistence.

The results of this study provided valuable information to DMAACC and others on the issue of how best to foster engagement in a diverse population of community college students and provide support in their persistence to successful completion. The next chapter presents a summary of the study, discussion of findings and limitations, and suggested studies for future research.

CHAPTER 5. SUMMARY, FINDINGS, CONCLUSIONS, AND RECOMMENDATIONS

In order to meet the needs of students and facilitate their educational pursuits, the focus on student retention is a primary area of concern to educational institutions (Barefoot, 2004; Lotkowski et al., 2004; Tinto, 1993). While many students enter postsecondary education each year with various hopes and aspirations, retaining them to achieve their academic goals presents a critical challenge.

Since 1983, the American College Testing (ACT) has published the *ACT National Dropout and Degree Completion Tables*. Retention from the first-year to second for students enrolled at public four-year baccalaureate institutions in 1983-2006 ranged from a low of 66.4% in 1996 and 2005 to a high of 70.0% in 2004. In 2006, student retention was at 69.9%. For community colleges student retention from first-year to second declined from a high of 53.1% in 1983 to low of 51.3% in 2004. While rates fluctuate from year to year it is disturbing to note that the community college rate is significantly lower than four-year institutions.

Virtually all postsecondary institutions have developed individualized frameworks of student support in the areas of academic advising, financial aid, and social and academic constructs for students. While retention initiatives abound and multiple studies have been conducted to assess the benefits of those programs, the effectiveness of the practices becomes more problematic when transferring those models to the community college setting.

The community college student base is broad, diverse and for the most part a commuter population. Community college students are frequently challenged to blend their

academic pursuits with work and/or family obligations. Time on campus becomes fragmented and brief. Campus residences, if available, are often not an option. Retention interventions based on the traditional college experience do not readily adapt.

The need for colleges to retain students to the achievement of their postsecondary academic goals is increasingly critical in today's expanding global economy. While four-year baccalaureate colleges have developed different supportive resources for students in the area of academic developmental coursework, advising and counseling, the majority of the models and research available focused on residential four-year environments and traditional aged students. The challenges faced by community colleges with their non-traditional student base and commuter status don't allow for ready translation of the models or research implemented in the four-year institutions. This research project studied the fall to spring persistence of an identified pool of late registering students through directed advisement and placement in first-year academic support models at Des Moines Area Community College.

Findings

The study and design of programs that are effective in supporting students has been at the forefront of researchers for over thirty years. A pioneer in the field of student retention, Tinto (1975, 1993) conducted extensive research on the issue of student attrition.

Gardner (2005) and colleagues from the Policy Center on the First-year of College at Brevard, North Carolina in collaboration with the University of South Carolina's National Resource Center for the First-Year Experience and Students in Transition have pioneered a national focus on student engagement practices in the first-year of college. More recently, Kuh (2005) and colleagues from the Center for Postsecondary Research at Indiana University

conducted the Documenting Effective Education Practice (DEEP) project which studies effective practices of colleges and universities in the area of student persistence.

The theoretical framework that supported this study focused on three retention theories: (a) interactionist theoretical model (Tinto, 1975); (b) psychological theory of self efficacy (Bandura, 1977), and (c) a combination of four psychological theories: attitude and behavior, self-efficacy, coping behavior and attribution relative to student attrition synthesized into a heuristic psychological model of student retention (Bean & Eaton, 2000). The Input-Environment-Output (I-E-O) model (Astin, 1993) provided the framework to organize and study the data.

While research supports the effectiveness of first-year seminars, learning communities and developmental course work in academic persistence, limited data have been provided on the effectiveness of directed participation in these options. The comprehensive statistical research of this Mandatory Placement Project was designed to provide insight into the value of instituting a directed academic experience in a community college setting and add to the body of knowledge on the efficacy of student retention initiatives in community colleges. Specifically, this study was initiated to determine if the Mandatory Placement Project conducted at DMAACC was an effective intervention for student support in the areas of persistence from fall to spring for late registering students. It was also intended to identify potential variables that would enhance students' likelihood of fall-spring persistence.

Design and Methods

The researcher conducted a statistical analysis focusing on student persistence from fall to spring term within a directed first year academic experience Mandatory Placement

Project. This project was conducted with a sample of 444 full-time, first-time, late registering students at the Des Moines Area Community College Ankeny Campus in the fall semesters of 2006 and 2007.

The researcher employed a non-experimental mode of inquiry using descriptive statistics with frequency distributions and cross tabulations to provide a profile of the population and participation, and examine relationships. Inferential statistical procedures of Pearson's correlation and blocked multiple regression were employed to test the null-hypotheses and study the predictability of any of the variables in persistence from fall to spring. Pearson correlation was employed to identify significant correlations between the independent variables and the dependent variable of fall to spring persistence. A multiple regression implementing the standard method was used in the block regression to observe changes in significance in relationships of the variables between the models. The conceptual I-E-O model (Astin, 1993) was used to make sense of the data. A significance level of $p < .05$ was set to study the significance.

Students were categorized into two separate samples depending on their actual course registration dates. The samples for study were designated as pilot and control. The pilot sample consisted of 270 late registrants who registered for classes as first-time, full-time students during the two weeks prior to the semester start. The control sample consisted of 174 full-time students enrolling during the first week of the semester.

Limitations

This study was focused on student retention and potential programming support mechanisms for a specific community college in Iowa. It addressed the issue of enrollment in

each of the supported course options of: The College Experience, Study Strategies, Learning Communities and College Prep courses in Reading, Writing and Math. Therefore, the findings and conclusions should be viewed with caution as they may not be generalizable to other institutions or other states.

Conclusions

This study focused on the issue of enrollment within each of the supported course options: The College Experience, Study Strategies, Learning Communities and College Prep courses in Reading, Writing and Math. Tinto's (1975) initial student attrition theory on how students who are not engaged in the college environment will leave and his ensuing retention model focusing on social and academic integration as well as Bean's and Eaton's (2000) expansion of Tinto's theory with their model of motivation theory guided the study.

As a researcher focused on student retention and potential programming support mechanisms for community colleges it was important to identify factors that would potentially be predictive of student success in persisting towards their academic goals. The following is a summary of the conclusions made in conducting the study of the Mandatory Placement Project at DMACC.

In the area of participation:

1. Of all of the environments provided in the study, Learning Communities were the only environments that were a significant predictor of persistence for students. These environments held a broad appeal to traditional and non-traditional age groups, minority groups, Pell grant students, first generation students, and males and females. This was the most frequently selected environment for the control sample. Outside of

- College Prep Math, students from the control sample self-selected these environments most frequently.
2. College Prep Math was the most frequently selected of any of the environments. Minorities selected this more frequently than any other environment. Actually over half of the minorities in the study participated in College Prep Math. Non-traditional students also selected this environment most often. The environment held a broad appeal to men and women alike, as well as Pell grant and first generation groups. This environment was also the most frequently self-selected environment by the control sample students. Interestingly, it was not the most frequently selected environment for the pilot sample. It was the third. Study Strategies and Learning Communities were selected more frequently by pilot sample students.
 3. Of the non-developmental environment options provided in the study, The College Experience was the least selected environment overall. Analysis demonstrated participation was dominated mostly by white male traditional aged students. Only two non-traditional aged students selected this environment. It was also the least selected environment by minorities. Only four minority students selected this environment. Without the directed advisement provided to the pilot sample, this was the least frequently selected environment by students in the control sample.
 4. With the exception of the College Experience and College Prep Math, minority participation in the six environments appeared to be fairly uniform. Approximately one quarter of the minority students in the study selected the environments of Study Strategies, Learning Communities, College Prep Reading and College Prep Writing.

- The most frequently selected environment by minorities was College Prep Math. The least frequently selected environment was the College Experience.
5. Non-traditional aged students selected the environments of College Prep Math, Learning Communities and Study Strategies most frequently. College Prep Reading and College Prep Writing participation was about equal with fewer than ten participants. The College Experience was the least frequently selected environment with only two of the forty-seven non-traditional aged students participating.
 6. First generation students selected College Prep Math, Learning Communities and Study Strategies more frequently than any of the other environments. The least frequently selected environment was College Prep Reading. Students in this group selected the College Experience just slightly more frequently than College Prep Writing and College Prep Reading.
 7. Pell grant students selected Learning Communities and Study Strategies more frequently than any of the other environments. College Prep Math was the third choice followed by the College Experience. College Prep Writing and College Prep Reading were the least frequently selected environments.
 8. In each of the environments the percentage of males and females participation was fairly consistent with the exception of College Prep Writing. This was the only environment where more females than males participated.

In the area of outputs:

9. Credits retained are a significant predictor of persistence from fall to spring, meaning that students who retain 100% of their course credits will be more likely to persist.

Students from the pilot sample retained 100% of their credits at a rate about 12% higher than students from the control sample.

10. Term GPA is a significant predictor of persistence fall – spring, meaning that students who achieve a term GPA of C or better will be more likely to persist. The variable of term $GPA \geq C$ outputs demonstrated students in the pilot sample achieved a term GPA of C or better at a rate almost twice as high as did the control sample. Strictly looking at participation in any of the environments the data demonstrated a slightly lower disparity; approximately one and one-half times as high.
11. Persistence from fall to spring for the study demonstrated that the pilot sample persisted at a rate 3.2% higher than the control sample. The Mandatory Placement Project appears to have a positive effect on fall–spring persistence for students. Students who participated in Learning Communities demonstrated the highest persistence of the environments followed by the College Experience and Study Strategies. While at a rate higher than the studied sample overall, students participating in any of the college preparatory environments demonstrated a markedly lower rate of persistence than the three non-developmental environments. Males and minorities who were from the pilot sample persisted at a higher rate than males and minorities from the control sample.

Recommendations

Based on the findings and conclusions of this study the following recommendations were made for practice as well as future study.

Practice

Students who were in the pilot sample participated in first-year course options more frequently than students from the control sample who were left to self-select. They also persisted at a higher rate than students from the control sample. Males and minorities in particular appeared to benefit from the components of the Mandatory Placement Project in the area of persistence. Focused directed advising of new students into first-year course options that will support their persistence in their studies should be continued and expanded.

Course options developed for first-year students should be studied for participation. At the college studied it appears that, while the College Experience environment was conducive to persistence for participants, it was limited in its scope of participation. It is important to have multiple environment options that address the needs of a diverse community college population.

Learning Communities are a significant predictive element for supporting and retaining students. Through their structure they provide students a positive connectivity to other students and as a result to the institution. They provide the broadest appeal of the environments to a diverse population of students. They were also most frequently selected by students without the benefit of directed advisement. The focus on combining first-year course options into learning communities should be continued and expanded.

The college preparatory environments provided the lower persistence rates for the study. Expanding the learning community element within College Prep Reading, College Prep Writing and College Prep Math would serve to enhance the persistence of students who are in need of developmental academic support. If resistance to participation in these preparatory courses is due to the non-transferability of credits, Learning Communities that

combined relevant elective credit courses with the college preparatory support courses might enhance participation and would provide needed academic support.

Future Study

The structure of the Mandatory Placement Project at DMACC had two tiers of advising that warrant further study. A secondary component of the project over the initial directed advising aspect included a continuation of personal contact with an adviser when changing, adding or dropping courses, or re-enrolling in the following term. While this component was not a focus of the study it is a component that cannot be ignored. This secondary required advising element was a distinct element that was not separated out for the purposes of this study. Future studies should address this two-tiered level of advising.

In the areas of F-S persistence and 100% credit retention, the researcher noted a wide disparity between minority students who were part of the pilot sample versus minority students who were part of the control sample. Minority students from the pilot sample demonstrated approximately an eight percent higher rate of F-S persistence and 14% more retained 100% of their credits. It is recommended that this project be replicated at a campus that has a higher number of minority students to further study the impact of the Mandatory Placement Project on minorities.

The study focused on fall-spring persistence of students. While persistence of students is an important component to the student retention equation it is not the only one. There was a significant increase in credit retention for students in the pilot sample over the control sample. This study identified that credit retention was a significant predictor of fall-

spring persistence. Future studies should address credit retention for students participating first-year environment options.

This study also identified that academic success in reference to term $GPA \geq C$ was a significant predictor for persistence. While it was reviewed as an output variable in this study it is recommended that this variable be studied further in researching the student retention equation.

Closing Thoughts

When I started this study I was the Project Director for a Title III Strengthening Institutions grant that DMACC had received from the federal government. One of the focus areas of the grant was to explore options that would support at-risk students and enhance student retention. DMACC had focused on student retention as a primary area of concern in providing both quality educational services and economic viability of the institution.

The Mandatory Placement Project was a direct outshoot of this grant and was structured with limited statistical research and much anecdotal research. It was developed with a committee of student support services resources, faculty resources and administrative resources. The process of analysis of this project has provided both me as the researcher and the College with a comprehensive picture of the resources that DMACC has to offer students in the arena of support and retention, and will serve as a valuable tool in the enhancement of the services and programming that the College will develop in the future.

APPENDIX A. VARIABLE DEFINITIONS

Variable Name	Definition	Scale
Enrollment Term (first_term)	Term of enrollment	200701 = Fall 2006 200801 = Fall 2007
Age Categories (age_first_term)	Student age at term of enrollment	0 = ≤ 24 1 = 25 thru 35 2 = ≥ 36
Race	Ethnicity categories	1 = White 2 = Black 3 = Hispanic 4 = Asian 5 = American Indian 6 = Unknown
Gender (sex)	Student gender	1 = Male 2 = Female
Race Grouped race_grouped	White/unknown and minorities categories	7 = W/U 8 = M
First-Generation (first_gen)	First-generation college students/no parental college experience	0=No 1=Yes
Pell Grant Status (pell_stat)	Need based financial aid eligibility	0 = No 1 = Yes
OC (orient)	The College Experience First-year course in orienting to college	0 = No 1 = Yes
SS (study)	Study Strategies First-year course in study strategies for postsecondary course work	0 = No 1 = Yes
CPM (math)	College Prep Math Developmental courses in math	0 = No 1 = Yes
CPW (engl)	College Prep Writing Developmental courses in writing	0 = No 1 = Yes
CPR (read)	College Prep Reading Developmental courses in reading	0 = No 1 = Yes
LC (learn)	Learning Community courses Linked courses with common enrollments and collaborating faculty	0 = No 1 = Yes
Read Cut Comb Read_cut_comb	ACT/COMPASS assessment scores in reading for entering students	1 = Below Cut 2 = Above Cut

Variable Name	Definition	Scale
Write Cut Comb eng_cut_comb	ACT/COMPASS assessment scores in writing for entering students	1 = Below Cut 2 = Above Cut
Math Cut Comb math_cut_comb	ACT/COMPASS assessment scores in math for entering students	1 = Below Cut 2 = Above Cut
C or Above (c_or_above)	Accumulated grade point average earned by student in the first term of enrollment	1 = Below C 2 = C or Above
100% Credits Retained (all_crs_retained)	100% of credits retained from initial enrollment to end of fall semester	1 = No 2 = Yes
Persist Follow Sem (persist_spring)	Persistence of students from fall (first-term) to spring	0 = No 1 = Yes
Sample Groups group	Students registering within 2 weeks prior to semester start = Pilot. Students registering within the 1 st week of classes = Control.	0 = Pilot 1 = Untreated
Participated (part_non_part)	Students participating in a studied environment.	0 = No 1 = Yes

Des Moines Area Community College

Acronym/Number SDV 115

Title Study Strategies

Credit breakout 2 2 0 0 - 0
 (credit - lecture - lab - practicum - work experience)

PREREQUISITE(S): None

COURSE DESCRIPTION:

This course provides students with study/reading strategies for independent learning and academic success. An examination of college policies and procedures is also included.

COURSE COMPETENCIES:

During this course, the student will be expected to:

1. Plan a semester of study.
 - 1.1 Set goals for the semester.
 - 1.2 Locate DMACC resources.
 - 1.3 Figure GPA.
 - 1.4 Identify DMACC academic standards.
2. Identify individual styles of learning.
 - 2.1 Analyze personal learning preference.
 - 2.2 Recognize characteristics of basic learning styles.
 - 2.3 Identify strategies to strengthen learning style preferences.
3. Develop the memory process.
 - 3.1 Select relevant information to learn.
 - 3.2 Organize information into meaningful segments.
 - 3.3 Rehearse selected information.
 - 3.4 Review for retention of information.
4. Manage time.
 - 4.1 Identify motivating factors.
 - 4.2 Identify prime study time.
 - 4.3 Implement monthly and weekly schedules.
 - 4.4 Analyze procrastination behavior.
5. Demonstrate effective textbook study techniques.
 - 5.1 Preview tests.
 - 5.2 Apply SQ3R study method.
 - 5.3 Monitor reading comprehension.
 - 5.4 Mark textbook information effectively.
6. Assemble effective classroom notes.
 - 6.1 Develop a standard format for notes.
 - 6.2 Predict test questions.
 - 6.3 Summarize class activities from notes.
7. Assess information for test preparation.
 - 7.1 Compare and contrast types of tests.
 - 7.2 Prepare a study plan for objective tests.
 - 7.3 Prepare a plan for subjective tests.
 - 7.4 Identify personal stressors.
 - 7.5 Recognize methods for reducing test anxiety.
8. Develop basic research skills.
 - 8.1 Locate information on the college library information network.
 - 8.2 Use library reference section.
 - 8.3 Identify steps in writing a formal research paper.
 - 8.4 Recognize consequences of plagiarism.
 - 8.5 Paraphrase information to avoid plagiarism.

Des Moines Area Community College

Acronym/Number **ENG 060**

Title **College Preparatory Writing I**

Credit breakout	3	3	0	0	0
(credit	lecture	lab	practicum	work experience)	

PREREQUISITE(S):

COURSE DESCRIPTION:

Introduces students to the writing process of planning, drafting and revising. Covers basic sentence and paragraph structure, grammar, punctuation, spelling and proofreading techniques. Students will compose 3-4 essays, learning to develop main ideas with specific support. Preparation for ENG 105. Cannot be used to fulfill degree requirements.

COURSE COMPETENCIES:

During this course, the student will be expected to:

1. Assess critical reading strategies.
 - 1.1 Distinguish between main and supporting facts and ideas in a selection.
 - 1.2 Draw well-reasoned and logical conclusions based on the information in a selection.
 - 1.3 Analyze a selection based on content, organization, and style.
2. Prewrite to explore topics and ideas for an essay.
 - 2.1 Limit a topic to suit the guidelines of the assignment.
 - 2.2 Generate adequate details and examples to develop the topic.
3. Organize information effectively in keeping with the purpose of the writing.
 - 3.1 Establish a clear focus and thesis.
 - 3.2 Structure supporting details and examples logically.
 - 3.3 Use transitional devices to build coherence.
4. Construct well-developed paragraphs.
 - 4.1 Recognize the function of paragraphs within the essay.
 - 4.2 Use a variety of organizational patterns in structuring paragraphs.
 - 4.3 Support main ideas with relevant details that contribute to paragraph unity.
5. Construct clear, concise, and effective sentences.
 - 5.1 Develop grammatically correct simple, compound, and complex sentences.
 - 5.2 Write sentences that follow the basic rules of grammar, spelling and punctuation.
6. Practice editing strategies.
 - 6.1 Revise globally for focus, content, and organization.
 - 6.2 Proofread accurately for sentence-level revisions: grammar, word choice, and punctuation

Des Moines Area Community College

Acronym/Number **MAT 053**

Title: **Pre-Algebra**

Credit breakout 4 4 0 0 0

PREREQUISITE(S):

COURSE DESCRIPTION:

A review of Arithmetic and an introduction to algebra. This is an adaptor course designed to strengthen arithmetic skills and introduce basic concepts of algebra in preparation for MAT 063.

COURSE COMPETENCIES:

During this course, the student will be expected to:

1. Apply the four arithmetic operations to whole numbers, fractions, and decimals.
 - 1.1 Apply the four arithmetic operations to whole numbers.
 - 1.2 Apply the four arithmetic operations to fractions.
 - 1.3 Apply the four arithmetic operations to decimals.
 - 1.4 Apply the four arithmetic operations to any expression involving whole numbers, fractions and decimals.
 - 1.5 Evaluate algebraic expressions using the four arithmetic operations.
2. Relate number theory to arithmetic calculations.
 - 2.1. Write related sentences.
 - 2.2. Write true number sentences using $<$ or $>$.
 - 2.3. Round numbers to a given place value.
 - 2.4. Apply rules for exponential notation.
 - 2.5. Simplify expressions using the rules for order of operations.
 - 2.6. Find the factors and multiples of a number.
 - 2.7. Find the GCF of two or more numbers.
 - 2.8. Find the LCM of two or more numbers.
3. Execute calculations involving ration, proportion, and percent.
 - 3.1. Write ratios and percents in fractional notation.
 - 3.2. Write percents in decimal notation.
 - 3.3. Write ratios and proportions for verbal problems.
 - 3.4. Translate percent problems into proportions.
 - 3.5. Solve proportions using variables.
4. Relate simple statistics to problems.
 - 4.1 Interpret data from tables, charts, and various graphs.
 - 4.2 Compute mean, medium, and mode.
5. Convert measurements within the Metric and U.S. Customary systems of measurement.
 - 5.1 State the common units of measure of weight, mass, capacity, length, time and temperature.
 - 5.2 Use unit fractions to convert between one U.S. Customary unit to another.
 - 5.3 Convert from one Metric unit to another.
 - 5.4 Convert between Celsius and Fahrenheit temperature scales.
6. Calculate the perimeter, area, and volume of various geometric figures.
 - 6.1 Calculate perimeter and circumference.
 - 6.2 Find the area of parallelograms (including squares and rectangles), triangles, trapezoids, and circles.
 - 6.3 Calculate the volume of a rectangular solid, cylinder, sphere, and cone.

- 6.4 Calculate perimeter and area using variables.
- 7. Use square roots and the Pythagorean Theorem to solve right triangles.
 - 7.1 Simplify expressions involving the square root of a perfect square.
 - 7.2 find the length of the third side of a triangle using the Pythagorean Theorems.
- 8. Use estimation techniques to check the reasonableness of results.
 - 8.1 Estimate sums and difference by rounding.
 - 8.2 Estimate products and quotients by rounding.
- 9. Compute with integers.
 - 9.1 Compare integers using $<$, $>$, or $=$.
 - 9.2 Name the additive inverse of any integer.
 - 9.3 Write the absolute value of any integer.
 - 9.4 Determine the sum of two integers.
 - 9.5 Determine the difference of two integers.
 - 9.6 Determine the product of two integers.
 - 9.7 Determine the quotient of two integers.
 - 9.8 Use the order of operations to evaluate numerical expressions.
- 10. Simplify algebraic expressions.
 - 10.1 Evaluate an expression for a given value of the variable.
 - 10.2 Use the commutative or associative property to simplify a given expression.
 - 10.3 Use the distributive property to simplify an expression.
 - 10.4 Use the properties of 0 or 1 to simplify an expression.
 - 10.5 Identify the value of a given expression with exponents.
 - 10.6 Implement the order-of-operations rules.
- 11. Solve first-degree equations in one variable.
 - 11.1 Solve linear equations involving one-step transformations using the addition property of equality.
 - 11.2 Solve linear equations involving one-step transformations using the multiplication property of equality.
 - 11.3 Solve linear equations involving two transformations.
- 12. Simplify expressions involving whole number exponents.
 - 12.1 Define a positive exponent.
 - 12.2 Define a zero exponent.
 - 12.3 Use exponent rules for products, quotients, and powers.
- 13. Compute with polynomials.
 - 13.1 Define polynomial.
 - 13.2 Evaluate a polynomial, given values for the variable.
 - 13.3 Classify a given polynomial according to number of terms.
 - 13.4 Find the sum/difference of two polynomials.
 - 13.5 Multiply polynomials.
 - 13.6 Apply the order of operations to simplify polynomials.
- 14. Graph using a number line and a rectangular coordinate system.
 - 14.1 Graph rational numbers on a number line.
 - 14.2 Plot a given ordered pair of rational numbers on a rectangular coordinate system.
- 15. Solve word problems involving any of the above.
 - 15.1 Determine what information in a problem is pertinent.
 - 15.2 Determine what operations will be necessary in solving the problem.
 - 15.3 Translate word problems into equations or other strategies.
 - 15.4 Check the feasibility of the answer.

Des Moines Area Community College

Acronym/Number **MAT 063**

Title **Introductory Algebra**

Credit breakout 4 4 0 0 0
 (credit - lecture - lab - practicum - work experience)

PREREQUISITE(S):

COURSE DESCRIPTION:

A beginning algebra course covering most elementary topics of algebra. This includes the real number system, solving equations and inequalities, polynomials, fractional equations, and radical expressions. This is an adaptor course designed for students with no algebra background or for students who need review.

COURSE COMPETENCIES:

During this course, the student will be expected to:

1. Compute with integers.
 - 1.1 Compare integers using $<$, $>$, or $=$.
 - 1.2 Name the additive inverse of any integer.
 - 1.3 Write the absolute value of any integer.
 - 1.4 Determine the sum of two integers.
 - 1.5 Determine the difference of two integers.
 - 1.6 Determine the product of two integers.
 - 1.7 Determine the quotient of two integers.
 - 1.8 Use the order of operations to evaluate numerical expressions.
2. Simplify algebraic expressions
 - 2.1 Evaluate an expression for a given value of the variable.
 - 2.2 Use the commutative or associative property to simplify a given expression.
 - 2.3 Use the distributive property to simplify an expression.
 - 2.4 Use the properties of 0 or 1 to simplify an expression.
 - 2.5 Identify the value of a given expression with exponents.
 - 2.6 Implement the order-of-operations rules.
3. Solve first-degree equations and inequalities in one variable.
 - 3.1 Classify statement as identity, contradiction, or conditional.
 - 3.2 Solve linear equations/inequalities involving one-step transformations using the addition property of equality.
 - 3.3 Solve linear equations/inequalities involving one-step transformations using the multiplication property of equality.
 - 3.4 Solve linear equations/inequalities involving two transformations.
 - 3.5 Solve linear equations for one variable in terms of other variables.
4. Write models for verbal problems that produce first-degree equations and inequalities in one variable.
 - 4.1 Translate phrases and sentences written in words into their algebraic form.
 - 4.2 Write an equation to solve a given word problem.
5. Simplify expressions involving integer exponents.
 - 5.1 Define a positive exponent.
 - 5.2 Define the zero exponent.
 - 5.3 Define a negative exponent.
 - 5.4 Use exponent rules for products, quotients, and powers.
6. Compute with polynomials.
 - 6.1 Define polynomial.
 - 6.2 Evaluate a polynomial, given values for the variable.
 - 6.3 Classify a given polynomial according to number of terms.
 - 6.4 Identify degree of term and/or polynomial.

- 6.5 Find the sum/difference of two polynomials.
- 6.6 Find the product of two polynomials.
- 6.7 Calculate the square of a binomial.
- 6.8 Apply the order of operations to simplify polynomials.
- 6.9 Find the quotient of two polynomials.
- 7. Factor polynomials.
 - 7.1 Remove the greatest common monomial factor.
 - 7.2 Factor by grouping.
 - 7.3 Factor a trinomial which is the product of two binomials with integral coefficients.
 - 7.4 Factor a binomial which is the difference of two squares.
 - 7.5 Factor polynomials completely.
- 8. Operate on rational expressions.
 - 8.1 Identify whether an algebraic expression is rational or irrational.
 - 8.2 Determine whether two rational expressions are equivalent.
 - 8.3 State the restrictions on the variables in a given rational expression.
 - 8.4 Simplify a rational algebraic expression.
 - 8.5 Express the sum/difference of two rational expressions in simplest form.
 - 8.6 Express the product/quotient of two rational expressions in simplest form.
 - 8.7 Solve equations containing rational expressions.
- 9. Graph a linear equation in two variables.
 - 9.1 Plot a given ordered pair of rational numbers on a graph.
 - 9.2 Name the coordinates, given a point on a graph.
 - 9.3 Determine ordered pairs which satisfy a given linear equation.
 - 9.4 State the x-intercept and y-intercept for a linear equation.
 - 9.5 Graph a linear equation on a coordinate plane.
- 10. Write the equation of a specified line.
 - 10.1 Define slope.
 - 10.2 Determine the slope, given two points.
 - 10.3 Determine the slope, given the equation of a line.
 - 10.4 Write an equation for a line given the slope and the y-intercept.
 - 10.5 Write an equation for a line given the slope and one point (not the y-intercept).
 - 10.6 Write an equation for a line given two points.
 - 10.7 Determine the slope of a line parallel/perpendicular to a given line.
- 11. Solve systems of linear equations.
 - 11.1 Recognize parallel, intersecting, and coinciding lines when given systems of two simultaneous equations.
 - 11.2 Solve system of equations by graphing method.
 - 11.3 Use elimination method to solve system.
 - 11.4 Use substitution method to solve system.
- 12. Compute with radical expressions.
 - 12.1 Simplify a single radical.
 - 12.2 Rationalize a denominator.
 - 12.3 Express sums/differences of algebraic square roots in simplest terms.
 - 12.4 Express products/quotients of algebraic square roots in simplest terms.
 - 12.5 Recognize between which two integers a square root of a number lies.
- 13. Solve quadratic equations in one variable.
 - 13.1 Use factoring to solve quadratic equations.
 - 13.2 Use the quadratic formula and/or completing the square.
 - 13.3 Write models for verbal problems that produce quadratic equations.
- 14. Use algebraic techniques appropriate to real-world and mathematical problem situations.

- 9.6.1 By factoring out the greatest common factor.
 - 9.6.2 By grouping.
 - 9.6.3 Factor trinomials by inspection.
 - 9.6.4 Factor trinomials by using the special cases of: difference of two squares; perfect square of sum; perfect square of difference; difference of two cubes; and sum of two cubes.
10. Perform the basic arithmetic operations with rational expressions.
- 10.1 Express rational algebraic expressions in simplest form.
 - 10.2 Find sums, differences, products and quotients of rational algebraic expressions.
 - 10.3 Simplify a complex fraction.
11. Perform the basic arithmetic operations with expressions containing rational exponents or radicals.
- 11.1 Express the square root of a negative number as a complex number.
 - 11.2 Perform the basic arithmetic operations with expressions containing complex numbers.
 - 11.3 Use the rules of exponents to simplify expressions containing rational exponents.
 - 11.4 Perform the basic arithmetic operations with expressions containing rational exponents.
 - 11.5 Convert an expression from radical to exponential notation and vice versa.
 - 11.6 Use the properties of radicals to simplify radical expressions.
 - 11.7 Perform the basic arithmetic operations with expressions containing radical expressions.
12. Graph linear equations/inequalities and quadratic equations.
- 12.1 Graph linear equations.
 - 12.2 Write the equation of a line.
 - 12.3 Graph linear inequalities.
 - 12.4 Graph circles, parabolas, ellipses centered at the origin, hyperbolas centered at the origin.
 - 12.5 Identify the type of conic section by inspecting its equation.
13. Solve systems of linear equations/inequalities and nonlinear systems of equations.
- 13.1 Solve linear systems of equations by the elimination method.
 - 13.2 Solve linear systems of equations by the substitution method.
 - 13.3 Solve linear systems of equations by Cramer's Rule.
 - 13.4 Solve systems of linear inequalities by graphing.
 - 13.5 Solve nonlinear systems of equations by graphing, elimination, or substitution.
14. Demonstrate an understanding of functions, function notation, inverse functions, and properties of logarithms.
- 14.1 Define a function.
 - 14.2 Determine the domain and range of a variety of functions.
 - 14.3 Construct a graph of functions including: linear functions, quadratic functions, polynomial functions, square root functions, and absolute value functions.
 - 14.4 Given two functions, construct the sum, difference, product, quotient and composition of the functions.
 - 14.5 Evaluate a given function.
 - 14.6 Determine the inverse of a function.
 - 14.7 State the relationship of a logarithmic function to an exponential function.
 - 14.8 Use a table to find common logarithms and antilogs.
 - 14.9 Apply the basic properties of logs when approximating computations of products, quotients, roots and powers.

Des Moines Area Community College

Acronym/Number MAT 093

Title Math Study Skills

Credit breakout 1 1 0 0 0
 (credit – lecture – lab – practicum - work experience)

PREREQUISITE(S):

COURSE DESCRIPTION:

Provides students with the study techniques necessary for successful completion of college preparatory or college credit math courses. It also addresses feelings and attitudes that might block the learning of math and offers strategies and techniques designed to overcome these feelings.

COURSE COMPETENCIES:

During this course, the student will be expected to:

1. Recognize the uniqueness of college math courses.
 - 1.1 Differentiate between high school and college courses.
 - 1.2 Differentiate between math and other courses.
 - 1.3 Recognize the need to take responsibility for one's own learning.
2. Examine math related attitudes.
 - 2.1 Examine the causes of math anxiety.
 - 2.2 Practice strategies for overcoming math anxiety.
3. Identify individual styles of learning.
 - 3.1 Analyze personal learning preference.
 - 3.2 Recognize characteristics of basic learning styles.
 - 3.3 Identify strategies to apply learning styles to math classes.
4. Explain thinking skills used in the study of math.
 - 4.1 Explain what it means to know math.
 - 4.2 Explain what it means to understand math.
 - 4.3 Explain what it means to apply math.
 - 4.4 Explain what it means to analyze math.
5. Manage time more efficiently and effectively.
 - 5.1 Discuss math time management.
 - 5.2 Plan a study schedule.
 - 5.3 Plan to take math courses in sequential semesters.
6. Demonstrate effective textbook study techniques.
 - 6.1 Read text and try problems prior to class.
 - 6.2 Recognize the necessity of using the text's answer key.
 - 6.3 Mark problems to be asked in class/tutoring session/office hours.
 - 6.4 Make math note cards.
7. Develop skills needed to be successful in the math classroom.
 - 7.1 Use two-column format for taking notes.
 - 7.2 Practice asking questions in a math class.
 - 7.3 Discuss active versus passive learning.
8. Apply math test-taking skills.
 - 8.1 Prepare a study plan for tests.
 - 8.2 Preview tests.
 - 8.3 Rework problems.
 - 8.4 Analyze test errors.
9. Identify resources for math help.
 - 9.1 Discuss meeting with an instructor during office hours.
 - 9.2 Identify supplements to the math text.
 - 9.3 Identify the process needed to obtain a tutor.
 - 9.4 Recognize services provided by the Academic Achievement Centers.
 - 9.5 Discuss the advantages of a study-group/study partner.

APPENDIX C. HUMAN SUBJECTS APPROVAL

IOWA STATE UNIVERSITY

DATE: 31 May 2007
TO: Janet Emmerson
 8116 Sharon Drive, Urbandale, IA 50322
CC: Dr. Larry Ebbers
 N 221A Lagomarcino 3196
FROM: Jan Canny, IRB Administrator
 Office of Research Assurances
RE: IRB ID 07-265

Institutional Review Board Office
 of Research Assurances Vice
 Provost for Research 1138
 Pearson Hall
 Ames, Iowa 50011-2207
 515 294-4566 FAX
 515 294-4267

STUDY REVIEW DATE: 30 May 2008

The Institutional Review Board has reviewed the project, "A Study of the Efficacy of Supported Academic Courses Offered at DMACC in Relation to Persistence, Grades and Credit Accumulation" (IRB ID 07-265) and has declared this study exempt from the requirements of the human subject protections regulations as described in 45 CFR 46.101 (b)(1). The applicable exemption category is provided below for your information. Please note that you must submit all research involving human participants for review by the IRB. Only the IRB may make the determination of exemption, even if you conduct a study in the future that is exactly like this study.

The IRB determination of exemption means that this project does not need to meet the requirements from the Department of Health and Human Service (DHHS) regulations for the protection of human subjects, unless required by the IRB. We do, however, urge you to protect the rights of your participants in the same ways that you would if your project was required to follow the regulations. This includes providing relevant information about the research to the participants.

Because your project is exempt, you do not need to submit an application for continuing review. However, you must carry out the research as proposed in the IRB application, including obtaining and documenting (signed) informed consent if you have stated in your application that you will do so or required by the IRB.

Any modification of this research must be submitted to the IRB on a Continuation and/or Modification form, prior to making any changes, to determine if the project still meets the Federal criteria for exemption. If it is determined that exemption is no longer warranted, then an IRB proposal will need to be submitted and approved before proceeding with data collection.

Exempt Category

(1) *Research conducted in established or commonly accepted educational settings, involving normal educational practices, such as (i) research on regular and special education instructional strategies, or (ii) research on the effectiveness of or the comparison among instructional techniques, curricula, or classroom management methods.*

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