FLORIDA INTERNATIONAL UNIVERSITY

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PROPOSAL FOR RESEARCH DISSERTATION

DOCTOR OF EDUCATION IN HIGHER EDUCATION

COLLEGE OF EDUCATION

DEPARTMENT OF LEADERSHIP AND POLICY STUDIES

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I propose to the Major Professor and to the Committee Members a study of the following topic to be conducted in partial fulfillment of the requirements for the degree of Doctor of Education: **A RETROSPECTIVE-LONGITUDINAL EXAMINATION OF THE RELATIONSHIP BETWEEN APPORTIONMENT OF SEAT TIME IN COMMUNITY-COLLEGE ALGEBRA COURSES AND STUDENT ACADEMIC PERFORMANCE**

Introduction

During the past decade or so, there has been a dramatic increase by postsecondary institutions in providing academic programs and course offerings in a multitude of formats and venues (Biemiller, 2009; Daniel, 2000; Kucsera & Zimmaro, 2010; Lang, 2009; Mangan, 2008; Tallent-Runnels, Thomas, & Lan, 2006). Strategies pertaining to reapportionment of course-delivery seat time have been a major facet of these institutional initiatives; most notably, within many open-door 2-year colleges. Often, these enrollment-management decisions are driven by the desire to increase market-share, optimize the usage of finite facility capacity, and contain costs, especially during these economically turbulent times.

While enrollments have surged to the point where nearly one in three 18-to-24 year-old U.S. undergraduates are community-college students (Pew Research Center, 2009) and these students received 32% of the $11.6 billion awarded in federal Pell Grants during the fall term of 2011 (Mullin & Phillippe, 2011), graduation rates, on average, still remain distressingly low (Complete College America, 2011). Consequently, as accountability pressure on community-college leaders to find ways to improve graduation rates continues to mount, course-delivery and course-scheduling paradigms are one institutionally-controlled variable that may be part of the solution (Rosenbaum, Redline, & Stephan, 2007).

In light of the fact that mathematics is one of the two largest general-education subject areas, with often the highest attrition rate in all of undergraduate education and customarily the one with the greatest percentage of remedial-level enrollees, this study will examine the relationship between seat-time apportionment in community-college algebra courses and student course success, course enrollment persistence, and time to commence/complete general-education level program-requirement coursework.

Purpose of the Study

The purpose of this retrospective-longitudinal study is to investigate whether scheduling courses in large time blocks (e.g., three or more hours once per week) is significantly related to the academic performance of community-college students who enrolled in one or more remedial-level mathematics courses offered in this format, as compared to the academic performance of students who enrolled in courses that met more frequently and in medium-length time blocks (of 75 minutes twice per week) or shorter-length time blocks (of 50 minutes thrice per week).

Significance of the Study

If the study demonstrates evidence of a significant relationship between course success and seat-time apportionment, these findings would have implications for better informing college administrators and faculty who construct course schedules each semester, as well as academic counselors who assist and advise students during the registration process. Also, the retrospective-longitudinal type of research design and multilevel analysis methodology proposed may serve to broaden the data-analysis perspective of institutional-research professionals who are often charged with compiling and analyzing retention/attrition data yet seldom employ these types of increasingly popular and computationally practicable statistical tools.

Research Questions

This proposed study's central research question is: Is there a relationship between seat-time apportionment in community-college algebra courses and course success, course enrollment persistence, and time to commence/complete general-education level mathematics coursework?

This overarching research question shall be subdivided into three component questions, in which student success shall be operationalized based upon the student's final letter grade earned in a given course:

1. In community-college developmental-level algebra courses, is there a difference in student success for students enrolled in classes that meet one day per week in longer-duration class meetings versus for those enrolled in medium-duration (twice weekly) class meetings versus for those enrolled in shorter-duration (thrice weekly) class meetings?
2. In community-college developmental-level algebra courses, is discrete survival time, as measured by date of withdrawal from the course, related to the number of class meetings per week and the duration of each meeting?
3. Across the sequence of community-college algebra courses, is there a longitudinal difference in time to commence (and/or time to complete) general-education college-level mathematics courses between students who satisfied the prerequisite algebra course requirements by completing one or more algebra courses scheduled in a one-day-per-week, longer-duration format and students whose prerequisite algebra course requirements were entirely fulfilled in courses that had medium-duration (twice weekly) or shorter-duration (thrice weekly) class meetings?

Theoretical Framework

The learning-theory constructs associated with reapportionment of seat time for course delivery pre-dates the field of experimental psychology. Ebbinghaus (1885/1964) pioneered the notion of quantifying the dependence between the formation (and level of inculcation) of memories of learned content that is completely new to the individual and the duration/pace of (and the time gaps between) each study session. In today's scholarly literature, the term used for this cognitive phenomenon is the *spacing effect*. Ebbinghaus's experimental findings lead him to conclude that "… with any considerable number of repetitions a suitable distribution of them over a space of time is decidedly more advantageous than the massing of them at a single time"

(Ebbinghaus 1885/1964, p. 89).

Over the 125-year span since Ebbinghaus's groundbreaking study of the spacing effect, a wide array of subsequent research has corroborated his conclusions and expanded their applicability (Cepeda, Vul, Rohrer, Wixted, & Pashler, 2008; Dempster, 1988; Hilgard, 1964; Kornell & Bjork, 2008). Nonetheless, despite the voluminous amount of scientific examination of the spacing effect over many decades, many scholars have pointed out the lack of inquiry into the spacing effect in the context of general classroom-type learning and, in particular, mathematical-skill development (Cepeda et al., 2008; Dempster, 1988; Rohrer, 2009; Rohrer & Taylor, 2006).

Furthermore, this dissertation-proposal author's extensive review of the literature uncovered few studies that have centered their scrutiny upon seat-time apportionment at the postsecondary level. In fact, only two studies that analyzed the issue in a community-college or undergraduate university-level mathematics context were located (Lazari, 2007; Odu, 2008). Both were cross-sectional in design and were limited to students enrolled in a college-algebra course. These gaps in the literature support the need for a more longitudinal-type study of the spacing effect in the context of a community-college mathematics classroom.

Methodology

The research design is ex post facto. The source of the data set shall be Broward College's student-records database. Broward College's Office of the Registrar has agreed to provide retrospective-longitudinal multivariate data for the entire multi-campus population of a student cohort enrolled in approximately 100 MAT0024 Elementary Algebra class sections during a past Broward College fall semester. The data collection for these roughly 2,500 subjects shall span a period of 2 full academic years, beginning with the Fall-2001 semester. Students

who are in that Fall-2001 semester MAT0024 cohort will then be tracked over the retrospective period in each of their subsequent mathematics courses (including any repeated attempts in a given course), as well as being tracked in their general enrollment progress toward fulfillment of their declared degree/certificate program requirements (when applicable).

The data will be collected and analyzed at three levels: (a) the individual student level, including each subject's institutional enrollment history, academic history (e.g., transcript, SAT/ACT and test scores, and high-school graduation date or date of GED completion), and assorted other (mostly demographic) covariates; (b) the MAT0024 class/section level (including, for example, grade-distribution data, number and duration of class meetings, instructor demographic information, aggregated student demographics, and so forth); and (c) the mathematics academic/course level (disaggregated by seat-time apportionment type).

Two multilevel multivariate and longitudinal statistical techniques shall be employed: logistic regression and survival analysis. Logistic regression's main advantages with regard to this proposed study include: its aptness for discrete DVs; its robustness against violations of other techniques' common IV distribution assumptions (e.g., normally distributed, homogeneity of variance, linearly related IVs); its suitability with a mixture of IV data types and measurement levels; and software programs' flexibility with model-building options (e.g., simultaneous, sequential, and stepwise). As for survival analysis, there are three main reasons why it is well suited to this proposed study's second and third research questions: its right-censoring technique provides a better way to address event nonoccurrence (e.g., not dropping out); its constructs (e.g., life tables and survivor/hazard functions) facilitate better modeling of retention/attrition and relationships to predictors; and it is readily adaptable to multilevel modeling (Heck, Thomas, & Tabata, 2010; Hox, 2010; Singer & Willett, 2003; Tabachnick & Fidell, 2007).

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