

Proposal Cover Page

Title: Preparation and Access: A Multi-level analysis of state policy influences on the academic antecedents to college enrollment

Grant Amount: \$14,943

Databases of Interest: (1) NCES Education Longitudinal Study (ELS:2002-04) Base-year, first follow-up and transcript study (Restricted file) , (2) the Integrated Postsecondary Education Data Systems (IPEDS) institutional characteristics survey (Public use), and (3) state level policy indicators dataset (compiled by Edward St. John and derived from publicly available data).

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Project Summary

For the past 25 years, state and federal policies have focused considerable attention on the high school curriculum. The issuance of *A Nation at Risk* was a call to arms for educators suggesting that as a nation, the U.S. was failing to educate its students sufficiently for future participation in society and the economy. In that time, an increasing number of states have adopted state level high school graduation requirements. Today all but five states have adopted statewide requirements and the majority of states have increased those requirements at least once since they were initially implemented (National Center for Education Statistics, 2001). These policies are frequently rationalized on the basis of relationships suggesting that students who take more academically rigorous courses – with math being a particular focus – tend to perform better on achievement tests, are more likely to attend college and ultimately more likely to earn a degree. This set of policy preferences toward better preparing students in high school continues to be a dominant theme in conversations of access to college.

The challenge for educators and policy makers is that little is known about the degree to which those policies have had the intended effects. Better prepared students do succeed at higher rates and in a variety of different ways at the collegiate level relative to their less prepared peers, but have these policies actually improved the levels of academic preparation for a greater number of students? In particular, how have these policies affected the courses students take, their achievement as measured by test scores and the rates at which they graduate high school? And have these policies had differential impacts for low income students and students of color – the two groups with comparatively fewer opportunities to access college? These are critical questions for policy makers at both the state and federal levels that, in an era defined by *No Child Left Behind* and accountability for student outcomes, are increasingly expected to create the conditions for all students to be successful in college if they choose.

Conceptually, the question of academic preparation in high school is a three level problem. Much of the research in this area focused on the individual student and the influence of parents, siblings, peers and the conditions within which they grew up. The individual is responsible to make a number of important decisions in the preparation process and this is the first level of analysis. An equally robust strand of literature emphasizes the role of the school, which includes the quality of teaching and instruction, the availability of guidance, the size and structure of the school, and the amount of funding available per student. Thus, the institutions responsible for educating students are the second level of analysis. Finally, states are increasingly important agents in the educational process. K-12 education is historically rooted in local communities, but recent efforts to provide more equitable educational opportunities for all students has involved states to a significant degree. More funding is coming from states than in prior history and consequently, states are also attempting to regulate schools through policy.

It is critical for policy makers to consider these three levels simultaneously, because the exclusion of any one will result in an incomplete snapshot of the complex educational environment within which students are being prepared for their futures, whether college is an outcome or not. Additionally, it is important to consider the issue of academic preparation in high school from a K-16 perspective because the outcomes have very real implications for high school educators and administrators and college and university educators alike. Equally, and perhaps largely absent from the literature on this issue is that opportunities for college may influence the decisions students make about their curriculum in high school as well.

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Statement of Problem and Variables

...access to American higher education is unduly limited by the complex interplay of inadequate preparation, lack of information about college opportunities, and persistent financial barriers. Substandard high school preparation is compounded by poor alignment between high schools and colleges, which often creates an “expectations gap” between what colleges require and what high schools produce. (U.S. Department of Education, 2006c, p. 1)

On September 9, 2005, Secretary of Education Margaret Spellings announced the formation of a national commission to chart a course for the future of American higher education. The commission met for more than a year and issued a set of recommendations to the Secretary for higher education in the 21st century. The Spellings Commission identifies college access as the primary challenge and it further articulates the four most common barriers typically identified in existing college access efforts. This study addresses a central element of college access – academic preparation. In many ways, this is not a study of college access per se; rather it is a study of the antecedents of one piece of the access puzzle which is student preparation.

The study examines preparation from a broader college access perspective for two reasons. First, higher education research focuses on the important role of preparation in college access and success, but it seldom considers the antecedents to preparation and the influences of policy on student preparation. Second, K-12 research explores those factors influencing student preparation in high school, but they seldom think about preparation in terms of college attendance and rarely address the influence that college admissions expectations and the cost of attendance may have on a student’s high school curricular choices.

The current relationship between academic preparation and college access and the shifting state policy landscape are significant because it suggests a fundamental shift away from the comprehensive high school model of providing some level of education to meet the needs and preferences of all students and its assumptions regarding how students learn and what should be taught toward a preparatory high school focusing on a more constrained set of courses and a different

set of expectations for what students should learn. If policies based upon the demonstrated relationships between preparation and college access are effective levers for improving student outcomes, then perhaps a shift is in order. However, seldom are actual policies included in analyses of student preparation and college access, with the exception of time series designed studies like that conducted by Clune and White (1992) examining course-taking patterns subsequent to a direct policy change. St. John and colleagues (St. John, 2004; St. John & Musoba, 2006) have begun this important work of linking state policy with student level outcomes in two-level models. St. John has found for example, that the relationships between math course-taking plays a complicated role in college access: improving test scores and college continuation rates while negatively influencing high school graduation rates.

The problem educators and policy makers face is that policy for the past 25 years or more has focused almost exclusively upon the high school curriculum as a way to improve student access to college, yet they have seldom examined how effective these policies have been. Equally, many states have made efforts to eliminate remedial education from four-year colleges (Jenkins & Boswell, 2002). At the same time, the nature of financial aid programs has changed dramatically in ways that reflect the shift away from need-based programs to merit awards and student loans (Advisory Committee on Student Financial Aid, 2001; Heller, 2004).

Proposal of Work

Research Questions

Based upon the review of literature, there are two primary questions motivating this study:

1. How do state policies influence student course-taking patterns in high school?
 - a. Do state level high school graduation requirements influence the number of courses students take in the core academic subjects?

- b. Does the cost of college in the state effect students' decisions regarding the courses they take in high school?
 - c. Does the increasing number of high schools offering Advanced Placement (AP) courses relate to different course-taking patterns?
 - d. Does the presence of a mandatory state exit exam influence the courses students take in high school?
 - e. Does K-12 instructional funding influence the courses students take?
2. How do student course-taking patterns, state policies, and institutional signals influence student achievement as measured by tests?
- a. Do state policies influence student achievement independent of the effects they have on course-taking patterns?
 - b. How do school level characteristics influence student achievement?

Theoretical Framework

Academic preparation in high school has been considered by scholars from a number of important perspectives. Sociologists, educational researchers both at the K-12 and higher education levels, and systems theorists have all made important contributions to our collective understanding of student course-taking, achievement, and high school graduation. Social theorists have considered the question of student outcomes in high school from two different perspectives. The first finds its roots in the work of Blau and Duncan (1967), utilizing a status attainment framework to examine social stratification in society and the process of social mobility. Status attainment theory provides a foundation for much of the research conducted by education researchers. Status attainment theorists generally focus on characteristics and aptitudes of the individual but ignore the influence of larger societal structures. The theory assumes that differences between one's origins and their destinations

depends largely upon the individual, while social reproduction suggests the structure of a capitalist society is critical in the understanding of social stratification and mobility.

In many ways, social reproduction theory offers a critique of status attainment theory. However, researchers on both sides share a common vision: that schools offer great promise in understanding and solving the tremendous inequalities by race and class. Bowles and Gintis (1976) provide the foundation upon which the social reproduction argument is built in education literature. They argue that schools alone could not change or appreciably reconcile the inequalities of income and status mobility because they were reflections of the broader social and economic capitalist structure in America. So long as a hierarchical division of labor existed, schools would serve to sort students for their roles in the economy. A substantial body of literature following this line of inquiry has explored the practice of tracking in high school (K. L. Alexander, Cook, & McDill, 1978; N. A. Alexander, 2002; Gamoran, 1987; Gamoran, Porter, Smithson, & White, 1997; Oakes, 1982; Oakes & Wells, 2004) and institutional diversification and diversion in college (Brint & Karabel, 1989; Clark, 1992; Rouse, 1995).

Educational theorists in K-12 education primarily view student outcomes in high school from a pipeline perspective, suggesting that if the nature and structure of schooling were improved upon, student outcomes would improve. Lee, Croninger and Smith (1997) – testing the constrained curriculum hypothesis – find that when schools adopt a more limited set of curricular options in the core academic subjects, students perform better on achievement tests and exhibit no difference in terms of high school graduation. Finn, Gerber, and Wang (2002) and others have expanded the pipeline conversations to consider the effects of the size of the school, the preparation of teachers (Goldhaber & Brewer, 2000; Teitelbaum, 2003), the influence of accountability (Hanushek & Raymond, 2004) and testing (Schiller & Muller, 2003), and the degree to which districts adapt to state policy changes regarding the high school curriculum (Sipple, Killeen, & Monk, 2004). With the exception of Chaney, Burgdorf, and Atash (1997) and less directly the earlier work by Clune and

White (1992), few K-12 educational researchers consider the implications of high school success in the context of college preparation.

The higher education research community has spent considerable time examining academic preparation as a predictor of college access. A number of studies in this vein utilize a pipeline framework (Adelman, 1999; Berkner & Chavez, 1997; Horn & Carroll, 1997) but they view academic preparation as a characteristic of students without considering the factors influencing preparation. Research in this area explore the relationships between college attendance, academic preparation as measured by test scores and highest courses completed and differences by income (Carnevale & Fry, 2000; Pelavin & Kane, 1990) and race (Gandara, 2002; Perna, 2000). Few researchers in higher education, with the exception of St. John and colleagues (St. John, 2004; St. John & Musoba, 2006; St. John, Musoba, & Chung, 2004), have considered the predictors of academic preparation in high school from a broader college access context.

Where curriculum theories were rooted in the relationship between high schools and colleges, status attainment theory explored individual characteristics and their influence on college access, and social reproduction theory emphasized the structural constraints present at the institutional level, K-16 institutional alignment theory suggests the alignment of two systems – K-12 and higher education – is the primary challenge to greater college access from the perspective of the state. A number of education policy advocates have made recent calls for better alignment of K-16 education (Haycock, 1999; Kirst & Bracco, 2004; Venezia, Kirst, & Antonio, 2003) and the development of college knowledge (Conley, 2005). Recently, Kirst and colleagues (Kirst & Venezia, 2004) explored system alignment empirically and suggest that students are under-prepared for college because they are not well informed regarding what four year colleges expect for admissions or what college costs.

In this dissertation, I suggest the question of academic preparation in high school operates on three levels – student, school, and state. A number of the studies discussed above have examined student level characteristics and school practices (two levels) as predictors of student course-taking,

achievement, and high school graduation. Recently, St. John examines the effects of state policies by looking at students nested within states (St. John, 2006). This study will explore three levels by looking at students nested within schools, aggregated student outcomes at the school level nested within states, and individuals nested within states. The combination of these three perspectives will allow for a fuller consideration of how factors at these three levels influence student course-taking patterns, achievement test scores, and high school graduation.

Data Sources

While the primary unit of analysis is the student, educators recognize that students are nested within schools and that those schools are nested within states. The state policy context is essential to consider because this is increasingly where important educational decisions are being made. In this study, I will use the Education Longitudinal Study (ELS:2002) – the most recently available national longitudinal study of students pathways through education. The survey includes three key sources of data: (1) the base year survey which includes students’ background characteristics and family information, (2) the school survey which includes characteristics of the high schools students attend, and (3) the transcript study including students’ actual course-taking information as well as their high school graduation status. ELS allows researchers to explore two levels of the problem but external data is necessary for the third.

For the past several years, St. John and colleagues (St. John, 2004; St. John, Chung, Musoba, & Simmons, 2004) have established a method for developing indicators of a number of important state level policies from publicly available data. The indicators include measures of state policies regarding high school curriculum policies, content standards in mathematics, Advanced Placement (AP) in high schools, and K-12 instructional expenditures in addition to college cost variables including average costs to attend college and the availability of a variety of forms of student aid. Prior work in this area linked policies existing from 1990-1992 with the National Education

Longitudinal Study (NELS:88-2000) to examine the influence of policy on test scores, high school graduation rates, and college continuation (St. John, 2006). The policy context surrounding education has changed dramatically in 12 years and ELS in combination with these indicators will provide similar but more current policy relevant insights.

Finally, I will utilize the Integrated Postsecondary Education Data System (IPEDS) institutional characteristics survey to identify the locations of every four-year college in the nation to calculate a proximity variable, measuring the distance between the high schools students attend and the nearest four year institution.

Variables in the Model

Outcomes

Course-taking patterns. Prior work has focused on math course-taking both in terms of the numbers of courses and the highest level of course (Lee, Croninger, & Smith, 1997; St. John, 2006). In this study I utilize a measure of all courses taken in the core academic subjects of math, science, English, Social Studies, and foreign language because state policies address each of these domains (sometimes excluding foreign language).

Student achievement. A number of metrics are utilized to gauge achievement including NAEP test scores (Lee et al, 1997, Chaney, Burgdorf, & Atash, 1997) NELS administered tests (Teitelbaum, 2003), and SAT scores (St. John, 2004). In this study, I utilize tests in math and reading administered as part of ELS in the 12th grade.

High school graduation. There are two ways to think about completion of high school. The first simply whether they complete or not as a dichotomous measure (Hoffer, 1997). St. John suggests utilizing a multinomial categorical outcome reflecting whether students fail to complete, complete a regular degree, or complete a regular degree with two separate levels of advanced math

course-taking (as a proxy for advanced and honors distinctions). I utilize St. John's methodology to recognize the variation with which students complete high school.

In models where students are the unit of analysis, these outcomes will be measured as the characteristics of the students. In models where schools are the unit of analysis, school averages will be utilized (average number of courses in the core subjects completed, average test scores). High school graduation will be different in the school models because one measure, percent completing high school in four years in the cluster of students from the school, will be utilized.

State-level Independent Variables

High school graduation requirements. In prior work, the focus has been on math (Lee et al, 1997; St. John, 2004) or math and science (Teitelbaum) with only Clune and White (1992) examining a broader range of course requirements. In this study I develop a four level categorical variable to characterize the degree to which the state level policy is highly constrained, moderately constrained, slightly constrained, or subject to local control (no state requirements). In the analysis, high constraint states and local control states will be compared with the middle two groups.

Exit exam requirements. St. John (2006) introduces this as a dichotomous indicator of whether or not the state has adopted a state exit exam as a condition for high school graduation. This policy has potentially important implications for high school graduation in particular.

Advanced Placement Course Availability. One feature of state level education that has changed dramatically in recent years is the growth of AP as an option in high schools. Part of this growth may be in part a result of No Child Left Behind which has created an incentive to increase AP offerings at Title I high schools.

Average tuition cost at a four-year institution. System alignment theory suggests that students are not well informed of the true costs of college (Kirst & Venezia, 2004; Conley 2005). St. John has utilized this measure exploring student's financial access to college (St. John, Chung,

Musoba, & Simmons, 2004). The cost of a four year institution is particularly important because policy is moving the high school curriculum more toward a four-year standard.

Cohort size. A recent report to the Lumina Foundation for Education (St. John, Chung, Daun-Barnett, Williams, and Fisher, forthcoming) contends that one of the important factors limiting college access today is the capacity of the state to accommodate all qualified students. It has been found that in a number of states, students have even been turned away from two year institutions for lack of capacity (National Center for Public Policy on Higher Education, 2004). St. John suggests utilizing cohort size (the size of the ninth grade class in 2000) is one way to account for these differences.

School-level Independent Variables

Proximity of school to four year college. Proximity has been considered as a predictor of college attendance (Tinto, 1973) as well as a variable to adjust for selection (Rouse, 1995) in predictions of college attainment. I use it in this study as a measure of alignment between high schools and colleges, testing the hypothesis that students attending high schools in closer proximity to four-year colleges are better informed of college admissions standards and as such are more likely to complete a rigorous high school curriculum. In order to create this variable, I utilize Geo-Spatial Information Systems (GIS) software to calculate the distance between the high school zip code and the zip code of the nearest four year college.

K-12 funding per FTE. The amount of money spent per student has been a particularly contentious issue since the Coleman report (Coleman, 1966). Some contend money does not matter (C. E. Finn & Walberg, 1994), but the evidence is mixed (Burtless, 1996).

Size of school. Current policies have changed the nature of the high school curriculum and recent reform initiatives like those undertaken by the Bill and Melinda Gates Foundation have

emphasized smaller high schools. This is an actual measure of the enrollment of the school reported through the administrative survey of ELS.

Student/Guidance counselor ratio. McDonough (2005) contends that one of the important barriers to college preparation in high school is the lack of adequate guidance. This variable is a ratio of the number of guidance counselors in the school over the total enrollment.

Teacher training. *No Child Left Behind* has specified that all teachers in the core subjects should be highly qualified to teach in their subject areas. In this analysis I include a measure of the percentage of teachers teaching outside of their areas of concentration.

Percent minority students in school. One of the persistent issues facing education today is the desegregation. Despite enormous efforts to eliminate de jure segregation in schools leading up to and subsequent to *Brown v. Board*, schools have remained largely segregated by race. Recently, districts have moved away from established desegregation plans. Percent minority in the school is included to consider how segregation at the school level influences student level outcomes. Specifically, schools with between 26-75% minority students will be compared with schools with fewer than 25% and 75% or more students of color.

Student tracking as a school practice. Oakes has found considerable differences between teaching practices in college preparatory tracks and general and vocational curricular tracks. Administrators have been asked if students are tracked in their schools and this variable is included in the analysis.

Individual-level Independent Variables

Socio-economic Status. NCES has created a composite variable for SES that includes income, parent's education, and occupation in part to deal with challenges of multi-collinearity. In this analysis, I will begin by testing separately income and parents education because, while they are related, they also approximate different advantages for students. Income reflects a families' ability to

pay for college where parent's education may influence student's ability to navigate the college preparation, application, and enrollment processes.

Race/ethnicity. Race remains an important and contentious issue. Some studies attempt to explain away the influence of race by suggesting that when students of color prepare better for college, they succeed at similar rates as their White peers. This of course, neglects the fact that far fewer students of color are prepared for college if and when they complete high school.

Prior achievement. Student test scores on the 10th grade test are included as a covariate because students' decisions to enroll in future courses are influenced by their perceived ability to do more advanced work. This control allows for the consideration of whether student coursetaking decisions influence future outcomes, independent of prior achievement.

Sex. For many years, sex was a concern because women were systematically discriminated against throughout the educational system. Today the picture is a bit more complex as young girls tend to do as well or better than boys in school.

Number of siblings. This measure is considered in combination with parent's income because the larger the family, presumably the more difficult it is for parents to afford assisting their children with the cost of college, other things remaining equal.

College expectations. Student plans for college have improved or remained very high, yet fewer students attend college than those that plan to do so. This variable is a self reported item asked during the base year survey.

Dissemination Plan

Consistent with the expectations of the Fellowship guidelines, I expect to present portions of this work at the Association for Institutional Research (AIR) Annual Meeting as well as the Association for the Study of Higher Education (ASHE) and American Education Research Association (AERA) Annual Meetings. I also plan to adapt aspects of the larger dissertation for

publication in the journals sponsored by the respective institutions. Additionally, as both an academic and a policy analyst in a state context, I plan to bring what I learn to bear on state-level decisions regarding these important issues. For example, in the state of Michigan, I will make my findings available to the Presidents Council for the State Universities of Michigan (PCSUM) and the State Board of Education – both of which were instrumental in Michigan’s recent adoption of state high school graduation requirements. Additionally, I intend to pursue a career as a faculty member, where the classroom will be my primary dissemination vehicle.

Description of Policy Relevance

Currently, K-16 initiatives are euphemisms for bridging the gap between K-12 and higher education and it is the policy community that is largely behind this movement. Academic preparation is one of four major issues affecting students’ transitions from high school to college (the others include the cost of college, the support and encouragement provided to students, and the capacity of the system to meet the changing demand) and it is the issue given the greatest attention today of the four. *A Nation at Risk* (National Commission on Excellence in Education, 1983) suggested that all students complete 4 English, 3 social studies, 3 science, 3 math, and 2 foreign language courses to earn a diploma (The High School Leadership Summit, 2003). For the past 25 years, 44 states have adopted more rigorous high school graduation requirements, as defined by an increased number of courses in the core academic subjects and also in the level of rigor expected in those courses.

As mentioned earlier, this is not only an issue affecting high schools. For example, as part of the NCLB legislation, there is an initiative to increase Advanced Placement offerings among Title I receiving institutions – an effort that affects both the high school curriculum and students potential access to college (by virtue of earning college credit while in high school). Additionally, financial aid has been significantly influenced by efforts to improve academic preparation in high school.

States for example, have increasingly shifted their financial aid funding priorities toward merit-based grant programs like the Georgia Hope program (Turner, Jones, & Hearn, 2004) or hybrids of need and merit considerations like Indiana's 21st Century Scholars (St. John, Gross, Musoba, & Chung, 2005).

Recent debates over reauthorization of the Higher Education Act focused attention on whether to expand significantly the Pell grant, which is the largest need-based program in the nation. Effective this year, Pell eligible students will be eligible for Academic Competitiveness Grants (ACG) during their first two years if they complete an approved high school curriculum (U.S. Department of Education, 2006a). They will also be eligible for National Science, Math Access to Retain Talent (SMART) Grant during their third and fourth years if they are Pell eligible, maintain a 3.0 GPA and pursue one of the approved Science, Math, and foreign language programs (U.S. Department of Education, 2006b). Both programs rely upon the curriculum students complete in high school – the first does so directly while the second recognizes that if students do not enter college prepared to succeed in the math and science fields, they seldom shift in that direction later.

Ultimately, this is an important issue for policy makers because it gets at the question of where states and the federal government should invest its money in education. The movement toward higher and more academically rigorous high school requirements is rationalized to achieve both equity (same high standard) and excellence (academic rigor). When students take a rigorous curriculum, they are likely to be better prepared for college and as such, less likely to require remedial education and more likely to complete college in the expected time. But there are tradeoffs to consider. Currently, there are a number of students who are otherwise prepared for college that cannot afford to attend (Fitzgerald, 2004). These students may begin to make decisions regarding their high school curriculum based upon their perceived ability to afford college. These are all important issues to policy makers and they will be addressed in this study.

Discussion of the Innovative Aspects of the Project

This study makes four important contributions to the literature on student preparation in high school:

1. It utilizes a K-16 framework that suggests student outcomes in high school are influenced by personal characteristics, family background, the school context as well as state policy and the higher education environment in the state.
2. The study utilizes the most recently available data on student pathways through high school. This is particularly important because state policies have changed dramatically in 12 years as has the relative cost of attending college.
3. Student outcomes in high school represent a problem that operates on three levels (state, school, and individual) and this study attempts to consider all three simultaneously, utilizing Linear Mixed Models which allow researchers to consider both random and fixed effects at multiple levels in longitudinal studies.
4. The study utilizes GIS, which is utilized in other academic disciplines but less frequently in education, to examine the possible proximal relationship between high schools and college and its influence on student outcomes.

Discussion of Audience to whom the Project will be Important

The proposed study will have implications for three audiences:

1. *Educational Researchers* – The conceptual model utilized in this study recognizes the important relationship between two systems – K-12 and higher education – and suggests that both must be considered when attempting to understand student's outcomes while in high school.
2. *Policy makers* – policy makers attempt to make the best possible decisions given our best understandings of the underlying problem and the most currently available data.

Many decisions continue to be made utilizing NELS, which is still relevant when looking at long term outcomes of education but less so, when considering the policies influencing the transition from high school to college.

3. *Institutional Researchers* – multi-level modeling of student pathways into and through college are growing more common, but they are still less prevalent in higher education research. Those concerned with student backgrounds as they enter college will find this research illuminating because it accounts for more of the complexities influencing students' preparation for college.

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Nathan Daun-Barnett

5433 New Meadow Drive ♦ Ypsilanti, MI 48197 ♦ (734) 945-3786 ♦ ndaunba@umich.edu

Education

University of Michigan, September 2002 – present, doctoral candidate in Higher Education Administration with a concentration in Public Policy, exploring the relationship between the high school curriculum and college access.

James Madison University, May 1998 – Masters of Education in College Student Personnel Administration.

State University of New York at Buffalo, May 1995 – Bachelor of Arts, Psychology.

Teaching and Professional Experience

Teaching Experience

Graduate Student Assistant - EDUC 771 P-16 Educational Policy Seminar

August, 2005 – December, 2005, University of Michigan

- Co-developed syllabus for course with Edward St. John
- Created on-line course supplement to assist student independent research
- Consulted class participants regularly on assignments
- Ordered course books and materials

Graduate Student Instructor – EDUC 793 & 795: Two course sequence in Quantitative Methods,

August, 2004 – May 2005, University of Michigan

- Taught laboratory section of both courses for Eric Dey, which included review of course material and training in SPSS for Windows and UNIX
- Provided regular individual assistance and support through weekly office hours and appointment
- Developed presentation on the uses of federal data including the National Education Longitudinal Study (NELS) and the National Household Education Survey (NHES)
- Graded weekly assignments and final projects
- Prepared and delivered lectures on data presentation, table formation, and logistic regression
- Developed on-line interactive tool for the facilitation of course work and communication

Research Experience

Research Assistant, August 2005 – present, University of Michigan

- Coordinated formative evaluation of institutional level strategic inquiry process on five campuses in Indiana participating in the **Indiana Project on Academic Success (IPAS)** project, a qualitative study to understand the successes and challenges of utilizing a strategic communication model to effect change in campus organizations

- Supervised two graduate research assistants and trained them to conduct interviews
- Coordinated, wrote, and submitted institutional review board IRB application
- Wrote interview protocol and conducted 15 interviews of campus administrators and faculty
- Created web-based learning tool for the class through the CTools learning environment at the University of Michigan and provide supplemental support to students enrolled in the class for ***EDUC 872: State Policy in Higher Education***

Research Assistant, July 2003 – May 2004, University of Michigan

- Coordinated national focus group to frame the issue of college access for deliberation
- Wrote discussion guide for the ***Access to Democracy*** project designed to facilitate dialogue within community contexts regarding higher education access
- Conducted literature reviews on the issues of access to college and on deliberative dialogue and its contributions to developing an engaged citizenry
- Moderated community dialogues among students, teachers, and community members
- Assisted in the writing of a successful Lumina Foundation for Education grant proposal

Research Assistant, August 2002 – July 2003, University of Michigan

- Managed data as part of the 2001-02 ***Survey of College Choices, Experiences and Retention (SOCCER)*** examining the issue of persistence among minority students at 24 highly selective institutions across the nation under the supervision of Michael Nettles.
- Managed and maintained several large-scale data sets linked with the Integrated Postsecondary Education Data System (IPEDS).
- Cleaned data and conducted analysis on a program evaluation of four summer enrichment programs for high potential minority students.

Consulting Experience

Lt. Governor's Commission on Higher Education and Economic Growth, Policy Research Team Coordinator, July 2004 – January 2005, State of Michigan

Coordinated research team from the Center for the Study of Higher and Postsecondary Education (CSHPE) to provide support for the *Lt. Governor's Commission on Higher Education and Economic Growth*. Wrote five research briefs addressing various aspects of the preparation students receive for college and the barriers they face to participation.

Lumina Foundation for Education, July 2006 – December 2006 – Co-authored a series of research briefs with Betty Overton-Atkins, designed to frame a program officer professional development series. Topics include race in higher education, transfer articulation among higher education institutions, adult learners, individual unit data tracking systems, and student access and success.

Midwest Higher Education Compact (MHEC) – November 2006

Prepared Midwest response to the *Measuring Up* report issued by the National Center for Public Policy in Higher Education. Presented findings to the MHEC annual meeting in Indianapolis, IN.

Technical Experience

Technical proficiencies include but are not limited to:

- Microsoft Office Professional products including Word, Excel, Access, and PowerPoint
- Data analytic packages including SPSS, Stata 9.0, and ArcGIS (Geo-Spatial Information Systems)
- Data management programs including Access, Filemaker

- Bibliographic Reference packages Endnote and Procite
- CTools on-line learning environment software, developed locally for the University of Michigan
- Desktop publishing programs including In Design, Adobe Illustrator, and PageMaker
- Proficient in the use of national data sources including IPEDS, Common Core of Data, US Census, and Bureau of Labor Statistic

Peer Reviewed Presentations

Preparation for College: Mapping the Complexity of State Policies Influencing the High School Curriculum, April, 2007, paper presented at the American Educational Research Association (AERA) Annual Meeting, Chicago, IL (forthcoming)

Level of Rigor: Considering Elements of a Constrained Curriculum and its Impact on Student Achievement, High School Graduation and College Continuation, November 2006, paper presented at the Association for the Study of Higher Education (ASHE) Annual Meeting, Anaheim, CA (forthcoming)

Higher Education and African-American Civic Participation: An Empirical Examination of the "Talented Tenth" Concept, November 2006, paper presented at the Association for the Study of Higher Education (ASHE) Annual Meeting, Anaheim, CA (forthcoming) with Larry Rowley and Thandi Sule'

Infusion of Innovation: Catalyzing Policy Change Through Research, November 2006, paper presented at the Association for the Study of Higher Education (ASHE) Annual Meeting, Anaheim, CA (forthcoming) with Thomas Perorazio

Implementing Strategic Inquiry to Improve College Success: Formative Evaluation of the Indiana Project on Academic Success, April 2006, Annual Meeting, Association for Institutional Research (AIR), Chicago, IL

Utilizing Geographic Information Systems (GIS) to Influence State Policy: A new descriptive, diagnostic, and analytical tool for higher education research, November, 2005 paper presented at the Association for the Study of Higher Education (ASHE) Annual Meeting in Philadelphia, PA with Britany Affolter-Caine

Access to College: A Reconsideration of the National Education Longitudinal Study (NELS), November, 2005 paper presented at the Association for the Study of Higher Education (ASHE) Annual Meeting in Philadelphia, PA

Linking research and leadership with a vision for change in postsecondary education policy. April, 2005, Symposium at the annual meeting of the American Educational Research Association (AERA), Montreal, Quebec with Burkhardt, J., Austin, J., Affolter-Caine, B., & Park, L.

Engaging Communities to Inform Education Policy, March 2005 paper presented at the American Association for Higher Education (AAHE), Atlanta, GA

Are High School Graduates Prepared for College? Aligning High School Graduation Requirements with College Admissions Expectations, November 2004 paper presented at the Association for the Study of Higher Education (ASHE) Annual Meeting in Kansas City, MO

Access to Democracy: Utilizing deliberation as a means of informing state level policy in Michigan, November 2004 Roundtable presented at the Association for the Study of Higher Education (ASHE) Annual Meeting in Kansas City, MO

Remedial Education: Are We Paying for the Same Education Twice? Analysis using NELS: 2000 and corresponding Transcript Study, April 2004, roundtable presented at the American Education Research Association (AERA) Annual Meeting, San Diego

Transformation at Jamestown Community College: Change in a Period of Retrenchment, November 2003, Michigan Association for Institutional Research Annual Meeting, Midland Michigan

Thurgood Marshall and Twenty-Five Years of Litigation Leading to Brown v. Board, November 2003, Midwest History of Education Society (MHES) Annual Meeting, Chicago

Academic Publications

Daun-Barnett, Nathan (Fall, 2005). *Institutional Policy Recommendations Regarding Mandatory Student Fees: A Legal Analysis*. Education Law and Policy Forum 1(1). Institute for Higher Education, University of Georgia.

Daun-Barnett, Nathan (2004). Who is College For? A Discussion Guide for Deliberation National Forum on Higher Education for the Public Good. Available at http://thenationalforum.org/who_is_college_for.pdf

Publications in Press

Daun-Barnett, N. (April, 2007) Book Review: Defending the Community College Equity Agenda. Planning in Higher Education xx(y). Ann Arbor, MI: Society for College and University Planning.

Rowley, L., Daun-Barnett, N., & Sule', V (revise and resubmit). Higher Education and African-American Civic Participation: An Empirical Examination of the "Talented Tenth" Concept. *Journal of Higher Education*.

Daun-Barnett, N. & Affolter-Caine, B. (in press). *Utilizing Geographic Information Systems (GIS) to Influence State Policy: A new descriptive, diagnostic, and analytical tool for higher education research*. In xxx, yyy (Eds.). The ICAFI University Press: Andhra Pradesh, India.

Daun-Barnett, N., Fisher, A., & Williams, K (in press). *Inquiry in Action: Formative Evaluation of Action Inquiry in a Multi-Campus Institutional Context*. In Readings on Equal Education, vol. 22. Hossler, D. & Ziskin, M. (eds). New York: AMS Press, Inc.

St. John, Edward P. & Daun-Barnett, Nathan (in press). Public Opinions and Political Contexts. In *Public Relations in Schools*, Kowalski, T.J. (ed). Prentice Hall.

Policy Research Publications

Daun-Barnett, N. & Affolter-Caine, B. (2006). *Measuring Up: A Midwestern Perspective*. Midwestern Higher Education Compact (MHEC): Minneapolis, MN.

Daun-Barnett, N. (November, 2006). Considering the Affirmative Action Debate. *Perspectives – Community Edition* 1(3). Available at <http://thenationalforum.org/CommunityBrief-July-71106.pdf>.

- Daun-Barnett, N. & Ott, M. (July, 2006). Understanding Michigan's Attitudes about Educational Attainment: Results from Community Dialogues and Public Opinion Surveys. *Perspectives – Community Edition 1(1)*. Available at <http://thenationalforum.org/CommunityBrief-July-71106.pdf>.
- Daun-Barnett, N., Molina, D, & Fisher, A.S. (March, 2006). Data Tracking Systems: Rethinking the Purposes and Benefits. *Education Policy in Review, 1(2)*. Available at http://thenationalforum.org/data_tracking_systems.pdf.
- Affolter-Caine, B. & Daun-Barnett, N. (December, 2005). Achieving the Vision: The Cherry Commission One Year Later. *Education Policy in Review, 1(1)*. Available at http://thenationalforum.org/DownloadFiles/PolicyBriefs/cherryCommission_012006.pdf.
- Daun-Barnett, N. (2004). *Academic Preparation in the Context of Higher Education: Identifying the Issues*. Research Brief published for the Lt. Governor's Commission on Higher Education and Economic Growth, State of Michigan. Document can be found at: http://www.thenationalforum.org/commission/academic_preparation.pdf
- Daun-Barnett, N. (2004). *High School Graduation Standards and Testing: Understanding the Complexities of Each*. Research Brief published for the Lt. Governor's Commission on Higher Education and Economic Growth, State of Michigan. Document can be found at: http://www.thenationalforum.org/commission/graduation_standards.pdf
- Daun-Barnett, N. (2004). *State High School Standards within Michigan and Across States: A Comparison of Approaches*. Research Brief published for the Lt. Governor's Commission on Higher Education and Economic Growth, State of Michigan. Document can be found at: http://www.thenationalforum.org/commission/high_school_standards.pdf
- Daun-Barnett, N. (2004). *Opt-Out Strategies in High Requirement States*. Research Brief published for the Lt. Governor's Commission on Higher Education and Economic Growth, State of Michigan. Document can be found at: http://www.thenationalforum.org/commission/opt_out.pdf
- Daun-Barnett, N. & Garrett, M. (2004). *Analysis and Consideration of Dual Enrollment Strategies in Michigan*. Research Brief published for the Lt. Governor's Commission on Higher Education and Economic Growth, State of Michigan. Document can be found at: http://www.thenationalforum.org/commission/dual_enrollment.pdf

Professional Development

AIR Summer Data Policy Institute, June 2004 – Participated in 10 day intensive training in the utilization of federally sponsored data gathered by the National Center for Education Statistics and the National Science Foundation. The training included in depth exploration of the IPEDS, National Education Longitudinal Study (NELS), National Study of Recent College Graduates (NSCRG), Survey of Doctoral Recipients (SDR), National Postsecondary Student Aid Study (NPSAS) and several others.

ASHE Graduate Student Policy Institute November 2003 – Nominated for and participated in two day policy seminar that addressed contemporary policy issues in higher education.

National Household Education Survey (NHES) Data Policy Seminar, June 2003 – Participated in four day seminar using the household phone survey conducted biannually by the National Center for Education Statistics (NCES). Training included the uses and methodology of the survey, NCES resources, the Electronic Code Books (ECB) and accessing the data, and the opportunity to answer research questions utilizing the data.

CURRICULUM VITA: EDWARD P. ST. JOHN

I. EDUCATION

- Ed. D. Harvard University, Graduate School of Education, Administration, Planning and Social Policy, 1978.
- M. Ed. University of California, Davis, Agricultural Education, 1974.
- B. S. University of California, Davis, Applied Behavioral Sciences, 1973.

II. CURRENT POSITION

- University of Michigan, School of Education, Ann Arbor, Michigan
- 2005- Algo D. Henderson Collegiate Professor of Education
- 2005- Research Affiliate, National Poverty Center at the Gerald R. Ford School of Public Policy
- 2005 Professor, Center for the Study on Higher and Postsecondary Education

III. SELECTED PUBLICATIONS

Books

- St. John, E. P. (Ed.). (2004) *Improving Access and College Success for Diverse Students: Research on the Gates Millennium Scholarship Program*, Readings on Equal Education, vol. 20. New York: AMS Press.
- St. John, E. P., & Parsons, M. D. (Eds.). (2004). *Public Funding of Higher Education: Changing Contexts and New Rationales*. Baltimore: Johns Hopkins University Press.
- St. John, E. P. (Ed.). (2004). *Public Policy and College Access: Investigating the Federal and State Roles in Equalizing Postsecondary Opportunity*. Volume 19, Readings on Equal Education. New York: AMS Press.
- Stage, F. K., Carter, D. F., Hossler, D., & St. John, E P. (Eds.). (2003). *Theoretical Perspectives on College Students*. ASHE Reader Series. Boston: Pearson.
- St. John, E. P., Loescher, S. A., & Bardzell, J. S. (2003). *Improving Reading and Literacy in Grades 1-5: A Resource Guide for Programs that Work*. Thousand Oaks, CA: Corwin.
- Miron, L F., & St. John, E. P. (Eds.). (2003). *Reinterpreting Urban School Reform: Have Urban Schools Failed, or Has the Reform Movement Failed Urban Schools?* Albany, NY: SUNY Press.

- St. John, E. P. (2003). *Refinancing the College Dream: Access, Equal Opportunity, and Justice for Taxpayers*. Baltimore: Johns Hopkins University Press.
- Priest, D. M., Becker, W. E., Hossler, D., & St. John, E. P. (Eds.). (2002). *Incentive-Based Budgeting Systems in Public Universities*. Northampton, MA: Edward Elgar.
- St. John, E. P., Griffith, A. I., & Allen-Haynes, L. (1997). *Families in Schools: A Chorus of Voices in Restructuring*. Portsmouth, NH: Heinemann.
- Finnan, C. F., St. John, E. P., McCarthy, J., & Slovacek, S. P. (Eds.). (1996). *Accelerated Schools in Action: Lessons From the Field*, Thousand Oaks, CA: Corwin Press.
- St. John, E. P. (1981). *Public Policy and College Management: Title III of the Higher Education Act*, New York: Praeger Press.
- Recent Articles*
- St. John, E. P., Musoba, G. D., & Simmons, A. B. (2003). Keeping the promise: The impact of Indiana's 21st Century Scholars Program. *Review of Higher Education*. 27: 103-123.
- St. John, E. P., & Ridenour, C. S. (2002). School leadership in a market setting: The influence of private scholarships on education leadership in urban schools. *Leadership and Policy in Schools*. 1(4): 317-344.
- Manset, G., St. John, E. P., Hu, S., & Gordon, D. (2002). Early literacy practices as predictors of reading related outcomes: Test scores, test passing rates, retention and special education referral. *Exceptionality*. 10: 11-28.
- Paulsen, M. B., & St. John, E. P. (2002). Social class and college costs: Examining the financial nexus between college choice and persistence. *Journal of Higher Education*. 73: 189-236.
- Peng, C. Y. J., T. H., So, S. Stage, F. K., & St. John, E. P. (2002). The use and interpretation of logistic regression in higher education: 1988-1999. *Research in Higher Education*. 43: 259-294.
- St. John, E. P., Simmons, A. B., & Musoba, G. D. (2002). Merit-aware admissions in public universities: Increasing diversity. *Thought & Action*. 27(2): 35-46.
- St. John, E. P. (2001). State policy and affordability of public higher education: The influence of state grants on persistence in Indiana. *Research in Higher Education*. 42:401-428.
- St. John, E. P. (2001). The impact of aid packages on educational choices: High tuition/high loan and educational opportunity. *Journal of Student Financial Aid*. 31(2): 35-54.

- St. John, E. P., and Ridenour, C. (2001). Market forces and strategic adaptation: The influence of private scholarships on planning in urban school systems. *The Urban Review*. 33:269-290.
- Hu, S. & St. John, E. P. (2001). Student persistence in a public higher education system: Understanding racial/ethnic difference. *Journal of Higher Education*. 72: 265-86.
- St. John, E. P., Hu, S. & Weber, J. (2001). State policy and the affordability of public higher education: The influence of state grants on persistence in Indiana. *Research in Higher Education*. 42: 401-428.
- St. John, E. P., Hu, S., Simmons, A. B., & Musoba, G. D. (2001) Aptitude v. merit: What matters in persistence? *Review of Higher Education*, 24(2): 131-152

Budget

Regents of the University of Michigan		1/11/2003		
Project Title:	Preparation and Access: A Multi-level analysis of state policy influences on the academic antecedents to college enrollment			
Project Director:	Edward St. John			
Project Period:	05/31/03 - 05/30/04			
Source:	National Postsecondary Education Cooperative/AIR			
Org. Code:	406800			
SPONSOR	Salary	FTE/ Units	Year 1 2007-2008	TOTAL
PERSONNEL			\$10,746	\$10,746
Temp Hourly			\$10,746	\$10,746
Nate Daun-Barnett	\$21.28	505	\$10,746	\$10,746
Fringe Benefits			\$860	\$860
Temporary Hourly @8%				
Consumable Supplies & Materials			\$837	\$837
RESEARCH			\$0	\$0
Software			\$350	\$350
GENERAL				
Books and Journals			\$487	\$487
Travel/Working Meals (Travel Status)			\$2,500	\$2,500
AIR Form conference		\$0.00	\$1,250	\$1,250
Other Conferences		\$0.00	\$1,250	\$1,250
Total Direct Cost excl. tuition			\$14,943	\$14,943
TOTAL DIRECT COST			\$14,943	
Indirect Cost Base	TDC		\$14,943	
Subtotal				\$14,943
Indirect Cost	0%		\$0	\$0
Grand Total			\$14,943	\$14,943
Rounding errors may occur				

Budget Justification

The salary estimate is based upon a 12 month cycle at approximately 10 hours per week, which will allow me to make progress toward my degree without assuming additional full-time work responsibilities. I budget for two separate conferences in the next academic year in order to broadly disseminate my work. The costs are approximate figures based upon prior experience attending professional conferences in higher education. Books and materials include primarily the latest texts pertaining to the topic under investigation and will include methodological texts and the software costs include both STATA and the most recent student version of SPSS.

Current and Pending Support

I currently serve in a part time, hourly capacity for Dr. Edward St. John on projects related to my areas of interest. No other sources of funding have been sought or granted.

Facilities, Equipment, and Other Resources

Not applicable

Special Information and Supplementary Documentation

Dear Selection Committee:

It is a pleasure to recommend Nathan Daun-Barnett for the AIR dissertation award. I have known Mr. Daun-Barnett for two and a half years and currently serve as his dissertation advisor. This letter addresses his development as a scholar and the quality of his dissertation proposal.

First, Mr. Daun-Barnett is maturing as a scholar in the study of high school preparation and college access. I first met him while serving as a discussant on a paper he presented at ASHE in November 2004, before I joined the faculty at the University of Michigan in January 2005. He was presenting a research paper he had prepared as part of the background research for the Cherry Commission, the Michigan higher education task force completed in 2004. Mr. Daun-Barnett had served as research director on a study for the commission in summer of 2004. Since that time he has further developed his interest in academic preparation and access as an outgrowth of this earlier work.

For the past two years Nathan has been a graduate assistant on projects I have directed at this university. He coordinated the work of two other graduate assistant on a formative evaluation of the Indiana Project on Academic Success, a large scale pilot test of research-informed change in Indiana colleges and universities. He also updated state policy indicators and completed a study of academic preparation in the states. Publications on this collaborative work are now in preparation. Nathan currently works with me on a study of Indiana's Twenty-first Century Scholars Program. During this same period, Mr. Daun-Barnett has consulted on several projects in collaboration with John Burkhardt for the National Forum on Higher Education and the Public Good. He has several policy papers completed as a result of this work. In addition, during the past few months I have supervised Mr. Daun-Barnett's work on his dissertation proposal.

Second, Mr. Daun-Barnett's dissertation should make a substantial and important contribution to the research literature on academic preparation. His study will use the most recent NCES longitudinal study, common core data on high schools, and state policy indicators. He will use HGLM, in a three-level model, to examine the impact of state K-12 policies and high school curriculum on college preparation (e.g. math courses completed in high school). While there have been a few studies that have used two-level HGLM to examine the effects of state K-12 policies on math preparation, these studies have not consider the role of course offerings. Mr. Daun-Barnett's dissertation will address the missing link in research. He will examine the ways curriculum in high schools influence preparation, controlling for state policy and student characteristics. His work should add substantially to the research literature on preparation.

Page 2,

Finally, it is important to note the Nathan Daun-Barnett is bright emerging scholar with a sincere commitment to making a contribution to research on academic preparation and college access. He is excellent quantitative schools. He is skilled at conducting analytic studies that support decision making and an experience author of policy reports. At the present time he is further strengthening his research skills with respect to high-quality academic research as a result of his dissertation work and his collaboration on the study of Indiana's Twenty-first Century Scholars Program.

Thus, I recommend Nathan Daun-Barnett for the AIR fellowship without reservation. His work is state of the art methodologically and addresses one of the most important policy issues of the current time: how state policy and high school curriculum influence academic preparation for college.

In addition, I hope that my belated letter does not cause a problem for Mr. Daun-Barnett's application. With the passage of Proposition 2, this has been an extremely busy period at the University of Michigan and I have been working on several related projects. My delay in performance of my duty as dissertation director should not detract from Nathan's consideration for this award. His work is of high quality, as well timely and important.

Sincerely,

Edward P. St. John
Algo D. Henderson Collegiate Professor

Summary of Changes Based Upon Reviewers Comments

In an effort to improve the dissertation fellowship proposal for Nathan Daun-Barnett, entitled Preparation and Access: A Multi-level Analysis of State Policy Influences on Academic Preparation for College, the following supplement is intended to respond to concerns raised by the review panel. In consultation with AIR staff, it was most appropriate to address the specific concerns raised by the review panel with a supplemental document rather than a full revision of the original proposals. In an effort to ensure coherence of this document, I have adapted the methods section from the original proposal and made the appropriate changes as they fit most logically. The primary concern raised by both reviewers was that the description of analytic methods was missing and as such, that is the focus of the supplemental proposal. Specifically, I will employ a 3-level hierarchical linear model (HLM) to examine the relationships among covariates at the individual, school, and state levels and academic preparation constructs including the number of courses in the core academic subjects, student achievement, and type of high school completion.

The review indicated a lack of specificity regarding the operationalization of some constructs and the inclusion of others. I have included new two pieces to make clearer the answers to both of these questions. First, I have included similar descriptions of all constructs included in the model, with additional attention paid to both the four-year proximity variable and the AP availability construct. Second, I have dropped the consideration of cohort size, which had been a state level indicator, based upon the sound logic of the review panel. System capacity is a particularly challenging issue in certain states and as the reviewers point out, size of the cohort is only important if we know something of the something about the space available in higher education to accommodate students. I have also dropped the tracking construct because in the context of ELS, it was difficult to operationalize given the structure of the administrative survey.

Third, I have added an additional section to describe more fully how this study contributes to the work of institutional researchers (IR). It is my belief that IR professionals will find this work valuable both in terms of the content and the method. Student preparation is an important antecedent to enrollment but it is also a concern for student persistence and degree completion. The better we understand how states are attempting to influence how well students are prepared for college, the more effectively we can understand the pathways they follow into and through college. Methodologically, HLM is most appropriate given the clustered nature of the data coupled with the multiple levels of influence on student outcomes.

Finally, I begin the supplemental proposal by focusing my research questions. The review suggested that there were too many questions for the dissertation. Instead of two questions with seven sub-questions, I have distilled the study to three essential questions leading directly to the three outcomes under investigation. I conclude that section with a rationale for the simultaneous consideration of all three questions in the context of college access.

Thank you for your consideration and I hope that the portions included here sufficiently respond to the comments and concerns raised by the review panel.

Research Questions

This study is motivated by three distinct but related research questions. Controlling for other factors at both the individual and school levels:

1. How do state policies – including high school graduation requirements, mandatory exit exams, AP availability, and average state public (4-year) tuition, and average K-12 instructional expenditures per FTE – influence student coursetaking in high school?
2. Do state policies influence student achievement?
3. Do state policies affect high school graduation?

These questions are reflected in the three outcomes identified and those outcomes are related. Policy makers are primarily concerned with student achievement as a measure of accountability, which is most commonly measured by tests. In order to influence achievement, policy makers utilize graduation requirements as a lever to improve the content offered to students, which should influence their scores on tests. As an unintended consequence, a number of researchers have posed and tested the degree to which these policies may inversely affect a student's likelihood of graduating from high school. All three of these outcomes are important pieces of the college access puzzle and as such, they are considered together.

Methods and Data Sources

While the primary unit of analysis is the student, educators recognize that students are nested within schools and that those schools are nested within states. In this study, I will use the Education Longitudinal Study (ELS:2002) – the most recently available national longitudinal study of students pathways through education. The survey includes three key sources of data: (1) the base year survey

which includes students' background characteristics and family information, (2) the school survey which includes characteristics of the high schools students attend, and (3) first follow up survey and the transcript study including students' actual course-taking information as well as their high school graduation status. I will consider only those students attending public schools as they are most directly influenced by state policy decisions. The transcript is particularly important as it includes all of the pertinent coursework as well as the outcome variable indicating high school completion.

For considering variability at the state level, St. John and colleagues (St. John, 2004; St. John, Chung, Musoba, & Simmons, 2004) have established a method for developing indicators of a number of important state level policies from publicly available data (discussed below). Prior work in this area linked policies existing between 1990-1992 with the National Education Longitudinal Study (NELS:88-2000) to examine the influence of policy on test scores, high school graduation rates, and college continuation (St. John, 2006). The policy context surrounding education has changed dramatically in 12 years and ELS in combination with these indicators will provide similar but more current policy relevant insights. Finally, I will utilize the Integrated Postsecondary Education Data System (IPEDS) institutional characteristics survey to identify the locations of every four-year college in the nation to calculate a proximity variable, measuring the distance between the high schools students attend and the nearest four year institution.

Analytic Method. In order to deal effectively with 1) students nested within schools which are nested within states and 2) the fact that cases included in ELS are not randomly selected, I employ hierarchical linear modeling techniques (HLM) to conduct the analysis. A number of studies considered above utilize HLM and the software developed by Raudenbush and Bryk (2002). Recently, West, Welch, and Galecki (2007) have published a text employing linear mixed models, a more general version of HLM, that demonstrates multilevel modeling techniques utilizing STATA, 9.2 software. In the context of this study, linear mixed models are appropriate for modeling the

number of courses students take in the core academic subjects because the outcome is linear and the data are clustered, where classrooms of students were selected from a random sampling of schools. The models are considered mixed because they allow the analyst to include both fixed effects at the individual and at the cluster level for factors conceptually related to the outcome of interest, as well as random effects of unobserved influences related to the clustering of cases that are assumed to be normally distributed.

Using single level regression techniques such as OLS to examine a multilevel research question may produce misleading results due to a variety of errors, including aggregation bias, mis-estimated standard errors, and heterogeneity of regression slopes (Luke, 2004). The risk of Type I error for the state and school level independent variables increases when OLS is applied to a multilevel dataset, since the degrees of freedom used to estimate significance are based on the number of students rather than the number of states (or schools) in the sample. Inferential errors, including the atomistic fallacy and the ecological fallacy, commonly result from the use of single level analysis on multilevel issues as well. In addition, HLM is a methodological approach that can make an important contribution to our understanding of campus issues and challenges, many of which are multilevel in nature. In college, students are nested within majors, which are situated within schools; students taking courses may differ on grades according to an instructor; instructors may differ by discipline or by tenure rank. The clustered nature of our campuses adds to the complexity of understanding and answering the questions posed regarding the operations and outcomes of college.

In this study, the school is one cluster that includes a number of fixed effects for school characteristics known to influence student's course-taking patterns and it will also include random effects for those unobserved school characteristics that influence student outcomes. The same is true at the level of the state, where several salient policies are hypothesized to influence student

course-taking; those factors are treated as fixed effects but there are also unobserved characteristics of the states, whether political, economic, social, or demographic, that may influence student outcomes in unanticipated ways. Hierarchical linear modeling has been frequently utilized in two level analyses of students nested within schools at the K-12 level (Chaney, Burgdorf, & Atash, 1997; Lee & Bryk, 1989; Lee, Croninger, & Smith, 1997; Teitelbaum, 2003), and it is becoming more readily utilized in higher education to study college access and enrollment (Musoba, 2004; Perna & Titus, 2004) and degree completion (Titus, 2006). Currently, none have looked at high school student course-taking as a three level model utilizing linear mixed models. A Generalized Linear Mixed Model (GLMM) will be utilized for the categorical outcome for different levels of high school completion.

Variables in the Model

This section includes brief descriptions of the constructs in the study and how they are operationalized in the data. Table 1 also provides a listing of those constructs and the variables utilized in the analysis.

Outcomes

Course-taking patterns. Prior work has focused on math course-taking both in terms of the numbers of courses and the highest level of course (Lee, Croninger, & Smith, 1997; St. John, 2006). In this study I utilize a continuous measure of all courses taken in the core academic subjects of math, science, English, Social Studies, and foreign language because state policies address each of these domains (sometimes excluding foreign language).

Student achievement. A number of metrics are utilized to gauge achievement including NAEP test scores (Lee et al, 1997, Chaney, Burgdorf, & Atash, 1997) NELS administered tests (Teitelbaum, 2003), and SAT scores (St. John, 2004). In this study, I utilize the standardized math

test score administered as part of ELS in the 12th grade. Ideally, a broader measure or multiple measures would have been utilized, but students were only asked to complete the math test during the first follow up.

High school graduation. There are two ways to think about completion of high school. First is simply whether they complete or not as a dichotomous measure (Hoffer, 1997). Second, St. John suggests utilizing a multinomial categorical outcome reflecting whether students fail to complete, complete a regular degree, or complete a regular degree with two separate levels of advanced math course-taking (as a proxy for advanced and honors distinctions). I utilize St. John's methodology to recognize the variation with which students complete high school.

State-level Independent Variables

High school graduation requirements. In prior work, the focus has been on math (Lee et al, 1997; St. John, 2004) or math and science (Teitelbaum, 2003) with only Clune and White (1992) examining a broader range of course requirements. In this study I develop a four level categorical variable to characterize the degree to which the state level policy is highly constrained, moderately constrained, slightly constrained, or subject to local control (no state requirements). In the analysis, high constraint states and local control states will be compared with the middle two groups.

Exit exam requirements. St. John (2006) introduces this as a dichotomous indicator of whether or not the state has adopted a state exit exam as a condition for high school graduation. This policy has potentially important implications for high school graduation in particular.

Advanced Placement (AP) Course Availability. One feature of state level education that has changed dramatically in recent years is the growth of AP as an option in high schools. Part of this growth may be in part a result of *No Child Left Behind*, which has created an incentive to increase AP offerings at Title I high schools. This construct is measured as a percentage of the public schools in the state that offer at least one AP course as indicated by the College Board's annual

reports. Adopting AP courses is in many respects a school (or district) level decision but I consider it in this study as an approximation of a states' commitment to dual enrollment strategies that allow high achieving students to maximize their coursework while in high school. AP availability is unique and important from a K-16 perspective because it reflects both a greater level of opportunity for students to prepare for college and equally of the state to adequately train high school teachers for advanced subjects.

Average tuition cost at a four-year institution. System alignment theory suggests that students are not well informed of the true costs of college (Kirst & Venezia, 2004; Conley 2005). St.

John has utilized this measure exploring student's financial access to college (St. John, Chung, Musoba, & Simmons, 2004). The cost of a four year institution is particularly important because policy is moving the high school curriculum more toward a four-year standard.

School-level Independent Variables

Proximity of school to four year college. Proximity has been considered as a predictor of college attendance (Tinto, 1973) as well as a variable to adjust for selection (Rouse, 1995) in predictions of college attainment. I use it in this study as a measure of alignment between high schools and colleges, testing the hypothesis that students attending high schools in closer proximity to four-year colleges are better informed of college admissions standards and as such are more likely to complete a rigorous high school curriculum. In order to create this variable, I utilize Geo-Spatial Information Systems (GIS) software to calculate the distance between the high school zip code and the zip code of the nearest four year college. For this variable I chose to focus specifically on proximity to a four-year institution rather than to any college or university (including two year institutions) because the movement toward constraining the high school curriculum at either the state or the school level is a four-year college standard. Community colleges are essentially open

enrollment for high school graduates so the hypothesis is that four-years generally set a higher level of preparation for admission and this is the bar advocated by recent state policy.

K-12 funding per FTE. The amount of money spent per student has been a particularly contentious issue since the Coleman report (Coleman, 1969). Some contend money does not matter (C. E. Finn & Walberg, 1994), but the evidence is mixed (Burtless, 1996).

Size of school. Current policies have changed the nature of the high school curriculum and recent reform initiatives like those undertaken by the Bill and Melinda Gates Foundation have emphasized smaller high schools. This is an actual measure of the enrollment of the school reported through the administrative survey of ELS.

Student/Guidance counselor ratio. McDonough (2005) contends that one of the important barriers to college preparation in high school is the lack of adequate guidance. This variable is a ratio of the number of guidance counselors in the school over the total enrollment.

Teacher training. *No Child Left Behind* has specified that all teachers in the core subjects should be highly qualified to teach in their subject areas. In this analysis I include a measure of the percentage of teachers teaching outside of their areas of concentration to approximate the quality of teaching within a given school.

Percent minority students in school. One of the persistent issues facing education today is the desegregation. Despite enormous efforts to eliminate de jure segregation in schools leading up to and subsequent to *Brown v. Board*, schools have remained largely segregated by race. Recently, districts have moved away from established desegregation plans. Percent minority in the school is included to consider how segregation at the school level influences student level outcomes. Specifically, schools with between 26-75% minority students will be compared with schools with fewer than 25% and 75% or more students of color.

Individual-level Independent Variables

Socio-economic Status. NCES has created a composite variable for SES that includes income, parent's education, and occupation in part to deal with challenges of multi-collinearity. In this analysis, I will begin by testing separately income and parents education because, while they are related, they also approximate different advantages for students. Income reflects a families' ability to pay for college where parent's education may influence student's ability to navigate the college preparation, application, and enrollment processes.

Race/ethnicity. Race remains an important and contentious issue. Some studies attempt to explain away the influence of race by suggesting that when students of color prepare better for college, they succeed at similar rates as their White peers. This of course, neglects the fact that far fewer students of color are prepared for college if and when they complete high school.

Prior achievement. Student test scores on the 10th grade test are included as a covariate because students' decisions to enroll in future courses are influenced by their perceived ability to do more advanced work. This control allows for the consideration of whether student coursetaking decisions influence future outcomes, independent of prior achievement.

Sex. For many years, sex was a concern because women were systematically discriminated against throughout the educational system. Today the picture is a bit more complex as young girls tend to do as well or better than boys in school.

Number of siblings. This measure is considered in combination with parent's income because the larger the family, presumably the more difficult it is for parents to afford assisting their children with the cost of college, other things remaining equal.

College expectations. Student plans for college have improved or remained very high, yet fewer students attend college than those that plan to do so. This variable is a self reported item asked during the base year survey.

Implications for Institutional Researchers

Increasingly, colleges and universities are facing calls for accountability based upon student outcomes. Among the most important considerations for colleges and universities once students are admitted, is whether they remain enrolled in the institution (persistence), whether they earn a degree, and how long it takes to do so. Equally, there are concerns for students moving from one major to another, when those decisions adversely affect their progress toward completion of degree requirements. Institutional researchers are most commonly called upon by their respective colleges to model these patterns and provide insight into the complex pathways students follow through the persistence and completion outcomes. Many of these analyses naturally begin with the level of preparation students receive prior to enrolling in college. Manske and Wise (1983) concluded in their seminal work that while many students that did not apply to college would have been admitted, most of those students would not have successfully attained a degree. The implication is that they were not adequately prepared to succeed. Policies at both the school and the state levels have been constraining student choices for many years and from an institutional research perspective, these constraints may be having some impact on which student enroll and how successful they become. This phenomenon in turn, influences institutional researchers' ability to make sense of enrollment, persistence and completion patterns, which are an important part of most accountability plans.

Methodologically this is an important study for institutional researchers because it provides an approach to considering student outcomes across campuses where students are clearly not randomly distributed. Rather, students are grouped according to majors, course grades may be influenced by instructors, classrooms, and pedagogical approaches, and faculty members differ by college and level in the tenure process. Partitioning the variance attributable to individual student characteristics from the variance attributable to groups in which the students are assigned or choose to join enables researchers to better avoid mis-assigning the effects of one level to another. In short, hierarchical linear modeling provides a way for understanding the clustered nature of our campuses.

Appendices

Table 1.
Variables in the Model

Variables	Description	Coding	Variable
<i>Outcomes</i>			
Courses in the Core Academic Subjects	Number of courses taken in the core academic subjects - based upon SST	Continuous	F1RHTAC
Student Achievement	Math standardized test score	Continuous	F1TMXSTD
High School Graduation	Completed school Fall 2004 to Spring 2004 compared with early completers and non-completers	Design Set - Multinomial Outcome	F1RTROUT
<i>Independent Variables</i>			
State Level Variables*			
High School Graduation Requirements	Four level variable including both the number of courses and the rigor of those courses	Ordinal	External data
Exit Exam Requirements	State requires passing a test for high school completion	Dichotomous	External data
AP Availability	Percent of schools in the state offering at least one AP course	Continuous	External data
Average Tuition Cost	The average cost of attending a public four-year college in 2002	Continuous	External data
K-12 Funding FTE	The amount spent per student on instructional expenditures	Continuous	Average for State Public Education
School Level Variables			
Size of School	Total number of students enrolled in 9th grade	Continuous	BYA01

Student/Guidance ratio	Total number of guidance counselors in school divided by total number students in school	Continuous	BYA23K/CP01STEN
Percent full-time teachers	Number of full-time teachers divided by the total number of full- and part-time teachers	Continuous	BYA22A/(BYA22A+(BYA22B)
Teacher Quality	Percent of full time teachers teaching out of field	Continuous	BYA25A
Proximity to Four-year	Variable calculated as the distance from the zip code of the high school attended to the zip code of the closest four-year public institution	Continuous	distance from BYSCHZIP to nearest 4-year college

Individual Level Variables

Race/Ethnicity	White Compared with Black, Hispanic and Asian, and Other	Design Set	BYRACE_1 TO BYRACE_5
Sex	Male Compared with Female	Dichotomous	BYSEX
Parents Income	Income will be considered in terms of quartiles where low income and high income will be compared to the middle 50th	Design Set	BYSES2QU
Parents Education	Parents Income will be coded with "less than a college education" and "four year degree or above" compared with "some college and less than a four year degree"	Design Set	BYPARED
Siblings	Number of siblings in the family	continuous	BYP08
College Expectations	Less than a four year degree compared with a four year or higher expected	Dichotomous	BYSTEXP
Prior achievement	Test scores in math and reading on the ELS administered test	continuous	BYTXCQU

*State level variables are compiled as part of project conducted by Edward St. John

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