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A study of the relationship between population growth and community college enrollment change in metropolitan statistical areas of the United States

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ABSTRACT

Publicly controlled comprehensive community colleges in the United States showed significant enrollment increases between 1990 and 2000. Much of the enrollment growth was observed to have occurred in fast-growing metropolitan areas primarily in the Western and Southern states. Factors that contributed to enrollment growth were similar to those contributing to population growth: increases in immigrant populations, an abundance of employment opportunities and areas such as information technology and health care whose primary skilled workforce earn training and skills through community colleges. General increases in postsecondary education enrollment, open-door enrollment policies, services for immigrant populations and policies toward low tuition also contributed to community college enrollment increases.

This study collected data from the U.S. Bureau of the Census and the Integrated Postsecondary Education Data System (IPEDS) in the years 1990 and 2000 to seek a statistically significant relationship between population growth in selected metropolitan statistical areas (MSA) and comprehensive community colleges serving those MSAs. The study was a nonexperimental, correlational design. A set of 30 community colleges representing slow-growth MSAs (mean population growth of 5.33 percent) and 37 representing fast-growth MSA (mean population growth of 35.973 percent) were compared using an analysis of variance (ANOVA) test and a correlation analysis.

The mean enrollment growth for community colleges in the fast-growth MSA group was 27.4765 percent and 26.0550 percent for the slow-growth group. A calculated P value of .909 and a correlation coefficient of .14 indicates neither statistically significant difference in

community college enrollment growth nor a correlation between population increase (or decrease) and community college enrollment growth.

CHAPTER 1. INTRODUCTION

Introduction

This research study seeks to determine if there is a relationship between a metropolitan area's population growth between the 1990 and 2000 censuses, and a community college's enrollment increase over the same period. The literature shows many factors that affect community college enrollment; this study will examine only the effect of population change within a metropolitan statistical area (MSA) on changes of enrollment in a community college located within the MSA. This study contributes to the literature and research base on community colleges because previous studies (Pennington, McGinty and Williams, 2002) have not isolated the simple relationship effect of population change on community college enrollments.

Community colleges in the United States enjoyed significant enrollment growth in the 1990s, a trend evident since the mid-1960s. This growth has been attributed to open access admission policies and a favorable employment market for graduates, driven by requirements for higher skill levels in employees (Cohen and Brawer, 1995). The country's growing immigrant population increasingly enrolls in community colleges as they seek entry into the skilled workforce (Camarota, 2001 and Szelenyi, 2002). Further, a nationwide trend toward enrollment stratification along income lines between community colleges and other sectors of postsecondary education, and an economic model that enables lower-income students to enroll in community colleges for their first entry into postsecondary education, has increased enrollments at community colleges (Levin, 1998). Finally, community colleges reflect

general increases in postsecondary enrollments in the U.S. (Digest of Educational Statistics, 2000).

The decade of the 1990s was a period of fundamental shifts in the rate of U.S. population growth. The slowest growth is evident in central cities in northern and eastern states, toward suburban areas and the Sun Belt areas of the southern and western states, according to the 2000 census.

A cursory examination of the largest community colleges in the United States would appear to match communities showing the fastest growth during the 1990s. Metropolitan areas such as Phoenix, Miami and Las Vegas are home to large, multi-campus, comprehensive community college systems with fast-growing enrollment, new facility construction and services tailored to assist immigrant, under-prepared and minority populations.

Not coincidentally, industries located within these communities experienced employment growth in industry sectors such as information technology, manufacturing, and health care – industries which community colleges prepare large numbers of potential employees. Conversely, community colleges in rural areas and small communities have struggled to maintain enrollments.

This study used United States Department of the Census data from the 1990 and 2000 decennial censuses to aggregate two sets of MSAs: Fast-growth and slow-growth, based on their rates of increase or decrease of population over the study period. Community colleges located within each MSA were identified and enrollment data retrieved from the U.S. Department of Education's Integrated Post-Secondary Educational Data System (IPEDS). The data collected were subjected to three statistical tests: (1) An Analysis of Variance

(ANOVA) to first ascertain that the mean population increase between the two groups of MSAs is statistically significantly different; (2) An ANOVA to test the mean community college enrollment growth between the fast-growth and slow-growth groups; and (3) A correlation analysis to test the statistical level of the relationship between MSA growth and community college enrollment growth.

Community college growth

Beginning in the 1960s and continuing through the 1990s, community college missions expanded to meet the educational needs of the communities they serve. Junior colleges created technical and career-oriented programs, and technical colleges created college transfer programs in the arts and sciences wherein students earn up to the first two years toward baccalaureate degrees. The term "comprehensive community college" (Cohen and Brawer, 1995) describes the type of institution that serves the wider mission of career, technical and vocational programs plus the arts and sciences programs. These are the colleges included in this study.

An observation of enrollment patterns within Des Moines Area Community College in Iowa shows that enrollment growth is stronger in urban locations than in rural locations, and that population trends within this college's service area are accurate predictors of enrollment patterns (Wolf, 2003). In the past nine years the college has opened sites in rural communities, which have had marginally sustainable enrollment growth, and in urban areas, which have had strong growth. This observed phenomenon was the impetus for an expanded analysis of a national sample of community colleges.

Community colleges located in states with the highest growth levels of 18 to 24-year-olds, the traditional age for first-time college enrollees (Arizona, California, Nevada and

Texas) have seen higher levels of enrollment growth than states with the slowest growth (the upper Midwest and the "rust belt" stretching from Iowa to the east coast).

Statement of the problem

Community college districts need empirical tool to predict enrollment trends and make site-selection decisions based on population within the community or region they serve. This study will seek a relationship or correlation, in a nationally representative sample of MSAs and their community colleges, between population growth and enrollment increase in the decade of the 1990s.

Purpose of the study

The purpose of this study is to seek a relationship between population trends in a nationally representative sample of MSAs and concomitant enrollment trends in community colleges located in and serving students drawn from those MSAs. The study will first review relevant literature describing population shifts in the U.S. during the 1990s, along with literature describing factors associated with community college enrollment over the same period.

A secondary purpose is to contribute to the literature of the study of community colleges in the U.S., and specifically, to the understanding of the complex relationship between demographics and enrollment.

Research questions

This study will seek to answer the following research questions:

First, based on a review of literature, is there a similarity of factors affecting the rate of growth or decline in population of an MSA and the rate of enrollment increase or decrease in community colleges?

Second, is there a statistically significant difference between fast-growing and slow-growing MSAs in the U.S.?

Third, if such a significant difference is found, is there also a statistically significant difference in enrollment growth between community colleges located in those groups of fast-growth and slow-growth MSAs?

Fourth, is there a statistical correlation between MSA population growth and community college enrollment growth?

Hypothesis

The hypothesis for this study states: Community colleges located in fast-growing MSAs will show larger increases in enrollment over the period 1990-2000 than community colleges located in slower-growing MSAs.

The null hypothesis states: There will be no statistically significant differences in the mean enrollment growth over the period 1990 to 2000 for community colleges in fast-growth MSAs versus community colleges in slow-growing MSAs.

Significance of the Study

This study will attempt to quantify any relationship, in a nationally representative sample, between the changes in population demographics in a sample of MSAs in the U.S. in the 1990s and community college enrollments over the same period. If such a relationship can be found, it will serve as a useful predictor of relationships between community college enrollment and the MSAs population changes in the future.

Enrollment patterns are a significant factor in site selection, curriculum planning and resource allocation for community colleges. Research is needed to enable college decision-makers to make informed decisions on site selection and allocation of staff and facilities for

community college campuses or centers. Because tuition revenues are an increasingly large component of operating revenue for most community colleges (Johnson, 2000), the issue of enrollment growth is an important consideration as institutions struggle to remain viable financially.

A secondary significance is that this study complements previous studies, described in Chapter 2, which indicate that a relationship might exist between population growth and community college enrollment increases.

Assumptions

This study assumes that the sample of 67 metropolitan statistical areas within 25 states is a representative sample of the nation as a whole. It assumes the accuracy of the 1990 and 2000 Census data in reflecting population changes in the MSAs in the sample, and it assumes the accuracy of IPEDS data in reporting enrollment changes in the sample community colleges. It assumes that enrollment data are a whole subset of the MSA population.

Limitations and delimiters

This study isolates a single relationship between two factors over the period 1990 to 2000: population increase in an MSA and community college enrollment growth. It does not account for affect of distance education or internet-based courses on enrollment data, nor does it account for the effect of students attending the community college who are not residents of the MSA. The study is limited to publicly controlled, two-year, comprehensive community colleges located within and serving only each MSA.

The decade of the 1990s is significant to study because it includes both a steep-but-short economic recession at the beginning of the decade followed by the longest economic expansion in U.S. history. As will be documented in the following chapter, community

colleges are assumed to absorb enrollment increases in poor economic conditions and lose enrollment in times of high unemployment. This study will represent both conditions.

Economic conditions within an MSA clearly have an impact on postsecondary enrollments, and this study includes a broad cross-section of economic prosperity indicators within the U.S. Extremes of household income are represented by the border-town poverty of Yuma, Arizona and McAllen, Texas. The prosperous technology and university cities of Fort Collins, Colorado, Portland, Oregon and Champaign, Illinois represent higher average household incomes (Almanac, 2000). Wheeling, West Virginia is in the heart of Appalachia's poverty belt and Syracuse, New York and Benton Harbor, Michigan represent the decline in the rust belt manufacturing sector.

Definitions of terms

For clarity and consistency, the following definitions apply to terms used throughout this study.

ANOVA (Analysis of Variance): The statistical tool used in this study to test the null hypothesis about the means of the two or more groups as measured by the sum of squares of deviations from the mean. An ANOVA measures variance within and between the means of each group.

Census: The comprehensive decennial count and analysis of population and demographic trends in the U.S. In this study, all MSA population data shall refer to official counts of the U.S. Census.

Comprehensive Community Colleges: For the purposes of this study, only institutions meeting the Carnegie classification for associate of arts colleges, offering vocational and technical programs at the two-year level, which also offer courses accepted for transfer at

institutions granting baccalaureate degrees and above, and are public colleges under the purview of a state-sanctioned governing board.

Correlation: A measure of the relationship between two variables. In this study, the correlation will measure the relationship and direction between MSA population growth and community college enrollment growth for colleges located within the MSA.

Enrollment Growth: The change in total headcount, expressed as a positive or negative number, from data reported in IPEDS.

Enrollment Head Count: The grand total of students in all categories, including full- and part-time students, from data reported in IPEDS

IPEDS: The Integrated Postsecondary Education Data System, a database operated by the U.S. Department of Education's Bureau of Education Statistics. Every postsecondary institution offering Title IV financial aid is required to submit data to IPEDS annually.

Large Cities: Major metropolitan areas with populations of 500,000 or more residents.

Medium Cities: Metropolitan areas between 50,000 and 500,000 residents in the metropolitan statistical area

Metropolitan Statistical Area: A geographical designation used in the Census to count population within a city or town and its adjoining suburban or rural population.

p Value: is the critical value indicating the degree of significance used to accept or reject the null hypothesis. In this study, the standard alpha level of 0.05 is used for consistency with educational research practices and standards.

Population Growth: The change in population of an MSA between the 1990 and 2000 censuses, described as a positive or negative number.

Small or Rural Communities: refers to the communities in the sample population with fewer than 50,000 residents.

CHAPTER 2. LITERATURE REVIEW

Introduction

This review of relevant literature will attempt build a case for examining a relationship between population increase in a MSA and community college enrollment increase within the MSA because the reasons for growth. This will be done in the following steps: (1) Describe the body of related research on quantitative modeling techniques for community college enrollment data; (2) Outline factors found in literature to describe the general increase in community college enrollment since the 1960s and more specifically in the 1990s; (3) Take a macro-view of population and demographic trends in the U.S. that have an impact on the enrollment base for community colleges, and (4) "Connect the dots" between similarities in the population growth and community college enrollment growth in the 1990s. These similarities are:

- Changes in population demographics in the U.S. have improved the market conditions for community college enrollment, traditionally defined as 18- to 24-year olds and older students returning to college to prepare for changes in the employment market.
- Immigrant populations have increased and have begun an increase in the attainment of postsecondary education, particularly in community colleges.
- Postsecondary institutions in the United States have shown general increases in enrollment, but faster in community colleges than in other sectors of postsecondary education.

- The direct relationship between a population of new high school graduates in a local area and increases in enrollment in local postsecondary institutions.

Factors affecting enrollment increases

The body of literature for community college enrollment is not extensive, especially in refereed journals. Just one book (McIntyre, 1999) and one professional paper (Shaw, Alspaugh and Wat-Aksorn, 1997) were found to directly address the issue of enrollment growth as a function of population growth.

McIntyre (1999) studied a number of factors impacting enrollment trends in community colleges, including tuition and fee structure, proximity of a state university, unemployment percentage within the service area, and most importantly, service area population. McIntyre states, "Two factors that are thought to be important determinants of enrollment – operating budget and service area population – are both positively related to enrollment (p. 14)."

Written for an audience of community college practitioners in general and enrollment management specialists in particular, McIntyre concluded the following enrollment trends: (1) Community colleges will increasingly be called upon to serve students of lower educational achievement through high school and general equivalency diploma (GED) programs; (2) more students will enroll part-time and will "stop-in, stop-out" into the institution instead of enroll continuously; and (3) with the exception of a small population of international students, most enrollment will be drawn from the local population. Colleges are advised to continuously monitor their market penetration, defined as head count enrollment

divided by service area population, or what McIntyre calls a "participation rate" and to utilize quantitative techniques such as linear regression models to forecast future enrollments.

Shaw, Alspaugh and Wat-Aksorn (1997) used population ratio techniques, "Bell telephone analogies," multiple factor and laws of growth to, albeit briefly, discuss the connection between population and enrollment trends. Their "population ratio" establishes a model of future enrollment in relation to present and previous enrollments. The "Bell telephone" analogy looks at new housing starts in fast-growing MSAs and uses an enrollment ratio factor to generate enrollment projections. While not providing a definitive correlation model, their study is valuable, and was developed for, local enrollment institutions such as K-12 schools but can be used as a background study for projecting enrollment in community colleges.

The definitive source found for describing the history and growth of community colleges in the U.S. was authored by Cohen and Brawer (1996). They point to the period of 1960-1975 as a period of expansion in the construction and opening of community colleges approaching maturation and saturation: "The number of public community colleges will hardly change; practically all the colleges necessary had been built by 1975, when a college could be found within commuting distance of nearly all the people in all but a few states (p. 419)."

Looking ahead, Cohen and Brawer anticipate an even larger market for community colleges among a growing enrollment base, citing continually dropping rates of high school dropouts and ever-increasing rates of postsecondary enrollment:

> Even a seemingly straightforward projection of the magnitude of population in general is subject to variability because of immigration patterns. One factor is

> certain: as long as the economic benefits of going to college remain high, there will be a demand for collegiate studies. There will be plenty of students to share among all postsecondary sectors (p. 421).

Lackey and Rowls (1989) describe three reasons why community and technical colleges were developed, and reasons why they are attractive educational options to larger numbers of students:

> First, they could focus on programs that are not normally offered by universities. Second, they were close to the jobs and could offer work-study arrangements. Third, they did not have the entrance requirements of the universities who could attract people with excellent technical ability but who might not do as well in the academic area of study (p. 44).

Community college enrollment patterns are stratified among lines of urbanization. It should come as no surprise that where there is higher concentration of people there is a higher enrollment of community college students. Katsinas and Lacey (2000) show enrollment totals in publicly controlled two-year schools being highest in urban and suburban multi-campus districts (Table 2-1). Their study, like the study described herein, is drawn from IPEDS data.

Table 2-1. Community College Enrollment by Degree of Urbanization

Location of College	Number	Average Enrollment
Rural	752	2,446
Suburban		
Single Campus	167	7,162
Multi-Campus	42	17,167
Urban		
Single Campus	61	6,830
Multi-Campus	57	24,566

If demography is destiny, nowhere is this more true than in enrollment trends in community colleges in the U.S. "The dominant factor . . . in the next two decades is not going to be economics or technology. It will be demographics (Drucker, 1997). Demographic changes already are affecting college enrollments. According to Keller (2001):

> Many colleges and universities watch the U.S. Bureau of the Census projections of the expected numbers of 18 to 24 year olds in their state and surrounding states. They know states like Arizona, California, Nevada and Texas are projected to have 40 percent or so increases in college-age youth between 1995-2015, and that Iowa, Kentucky, Maine and West Virginia face probable decreases in the number of 18-to-24 year olds by 2015 (p. 219).

Cohen and Brawer (1995) also believe in a direct relationship between a comprehensive community college's enrollment and the proximity and supply of recent high school graduates in the college's local area.

> Despite the programs appealing to older students, the enrollment figures in community colleges are affected most significantly by the number of recent high school graduates. Even though people twenty-four or younger comprise less than half of the student head count, that group accounts for 70 percent of the course load. Accordingly, college attendance will be affected notably by the differences in high school graduation rates (p. 421).

Rooney (2002) reinforces the relationship between economic slowdown and community college enrollment increases to explain a bump in enrollment rates in 2000 and 2001. But this article also hints at the relationship between population and enrollment growth, stating, "The traditional college-age population is swelling across the country, particularly in the South and West. And nontraditional, older students – many of whom have been in the job force for years – are also returning to the classroom in droves, looking for new skills as their economic prospects falter (p. A33)."

Finally, the significant pricing advantage of community colleges over other sectors of postsecondary education must be considered. Evelyn (2002) points to Cape Fear Community College in North Carolina as an example of a community college growing faster than both the large private and public universities in its vicinity because of the affordability factor: Cape Fear costs $500 per semester for a full-time student; the University of North Carolina at Chapel Hill costs $3200 per semester and Duke University over $13,500.

Postsecondary enrollment trends

According to the Digest of Educational Statistics (2000) the number of enrolled students in postsecondary institutions in the U.S. increased by 16 percent between 1985 and 1995, from 12.2 million to 14.5 million students. Following a slight decrease to 14.3 million between 1995 and 1998, enrollment rose again to 14.6 million by 2000. Their calculations project further increase of up to 17.1 million total enrollments by 2010, bolstering the assumption of a general increase in postsecondary enrollments. For the period beginning in 1985 and projected to 2010, enrollments in publicly controlled institutions are predicted to increase by 20 percent (p. 26). This report shows community college enrollments increasing at a higher rate than 4-year institutions over the period 1985 to 2010 (24 percent to 17 percent).

Census data (Census, 2000) and enrollment data (Digest, 2000) the fastest growing MSAs in the 1990 are home to fast-growing community colleges. For example, Las Vegas, Nevada is home to the Community College of Southern Nevada, which grew by 111.18 percent between 1990 and 2000. The Phoenix, Arizona metropolitan is home to the Maricopa Community College district, whose member colleges grew by an average rate of over 20 percent in the 1990s. Cape Fear Community College in fast-growing Wilmington, NC, grew by nearly 96 percent during the 1990s, and again by 12 percent in 2000 (Evelyn, 2002).

Conversely, slow-growth metropolitan areas like Cleveland, Ohio, grew by only 3 percent in the decade of the 1990s; its comprehensive community college, Cuyahoga Community College, showed a decline in enrollment (-15.7 percent) during the decade.

Frey (2003), citing 2000 census data, points out that the fastest-growing metropolitan areas are also home to the largest shares of households with children, a predictor of future postsecondary enrollments, according to Levin (1998).

Levin further postulates that postsecondary enrollment is increasingly becoming stratified along household income lines: students from higher income households enroll in private colleges, middle income students attend public universities, and students from lower income households attend community colleges. Clearly, this is not stratification in absolute terms, but a demographic trend evident during the 1990s. Since higher numbers of lower income families reside in more densely populated cities, community college enrollment growth would be higher in cities and suburbs than rural areas.

Doucette (1997) states that community colleges perform a "mass undergraduate education" function with a low-cost position that gives them advantages over public and private universities, and certainly over all sectors of private postsecondary education.

Projected growth in populations of traditional college-age students also is unequally dispersed among the states, both in absolute numbers and percentages of increase. A sample of the states included in this study, as reported in Carnevale (2001), is shown in Table 2-2.

Table 2-2. Projected Increases in Traditional College-Age Population (Carnevale, 2001)

State	Projected Increase in College-Age Population 2000-2015 Absolute	Percentage
California	1,586,823	50.7
Texas	511,171	24.0
Florida	284,285	22.7
Arizona	98,545	21.1
New York	329,398	20.2
Georgia	144,068	18.1
Michigan	11,976	1.3
Ohio	-3419	-0.3
Nebraska	-1727	-1.0
Maine	-2319	-2.1
West Virginia	-20.580	-11.8

Factors affecting population changes in the United States

One of the primary purposes of the census is to measure who lives where. Although the nation as a whole has continued to grow, this growth has been far from uniform: between 1990 and 2000, 684 of the nation's 3142 counties reported a population loss, many of them in the Great Plains states. At the same time, five counties, three in Colorado and two in Georgia, more than doubled their population between 1990 and 2000, and another 80 counties experiences growth rates greater than 50 percent. Altogether, 1109 of the nation's counties

reported growth that exceeded the national growth rate of approximately 13 percent between 1990 and 2000 (Glaeser, 2001).

A ranking of the 50 states by rate of population growth shows what appear to be significant differences among the eight fastest-growing and eight slowest-growing states (CensusScope, 2001). Each of these states is represented in the present study of population demographics and community college enrollment, as shown in Table 2-3.

Impact of immigration

Immigrant populations account for much of the population growth in the United States during the 1990s, and that many of these, especially Hispanics, migrate to urban areas. Only five percent immigrated to urban areas, while 45 percent moved to central cities and half to suburban areas. The educational attainment of immigrants shows more variation than is found in the native population. For example, less than six percent of the immigrants from Mexico, El Salvador and Guatemala have a college education and about 60 percent have not earned a high school degree. At the other end of the scale, "30 percent of the immigrants from Asia and Europe have at least a college degree compared to 28 percent of the native population (Camarota, 2001)."

A report from the White House Initiative on Educational Excellence for Hispanic Americans (1997) reports that Hispanic enrollment in public postsecondary institutions is higher in community colleges than in 4-year colleges and universities. Of the 135 public institutions reporting 25 percent or higher Hispanic enrollment, 102 are community colleges.

Table 2-3. States Ranked by Percentage of Population Growth Between 1990 and 2000 Censuses (CensusScope, 2001)

Rank	State	Percent Growth
1	Nevada	66.27
2	Arizona	39.98
3	Colorado	30.56
4	Utah	29.62
6	Georgia	26.37
7	Florida	23.53
8	Texas	22.76
43	Iowa	5.39
44	Ohio	4.67
45	Rhode Island	4.47
46	Maine	3.83
47	Connecticut	3.60
48	Pennsylvania	3.36
49	West Virginia	0.83
50	North Dakota	0.53

High school graduation rates have an impact on community college enrollments, according to Cohen and Brawer (1995). Given the fact that comprehensive community colleges can assist its students first with high school completion programs, an immigration

population with lower high school completion rates – such as those found in the fast-growing MSAs in the southwestern U.S. – actually helps increase community college enrollments.

In the first half of the 1990s immigration accounted for 29.8 percent of the U.S. population growth (Murdock, 1999), compared to 13.5 percent in the 1960s and 18.8 percent in the 1970s. The Murdock study, citing 2000 census data, further projects that 55 percent of the net growth in the U.S. population in the years ahead will be due to immigrants and their decendents (p. 7). The impact on higher education? "Immigrants will also play an increasing role in the educational service utilization in the United States, exerting demands for a greater diversity of products and services."

Swail (2002) states that colleges are "being pressed to service a student body that is vastly different than only a few decades ago." Demographic shifts in areas of fast-growing states such as California, Florida, and Texas have resulted in former minority groups now constituting the majority of the population:

> The real policy dilemmas for American higher education do not result from the size of population growth, but rather from where and how the growth is occurring. Not only are certain areas growing much faster than others, much of the increase is due to increased numbers of people of color . . . the 18-to24-year-old population in the United States is of interest because it is, and will continue to be, the primary market for postsecondary education.

Szelenyi (2002) found that community colleges are a valuable institution in the social and societal assimilation of immigrants into the U.S. by virtue of open access policies, affordability, and English as a Second Language programming.

Effects of income and other demographic factors

An emerging trend in postsecondary enrollment patterns in the U.S. is the stratification among lines drawn by household income. Although not absolute, it has been conjectured that: (1) Students from lower income households attend public community colleges; (2) Students from middle income households attend public universities; and (3) Students from the highest income households are most like to attend private colleges and universities (Levin, 1998).

Levin (1998) also believes that mobility factors play a role in population changes. Household mobility toward urban areas is most profound among renters, and renters are disproportionately from lower income levels. Levin concludes that the urbanization of the poor will continue in the decades ahead, and that their first engagement in postsecondary education will most likely be in a community college:

> Education in the U.S. is closely tied to both health and wealth . . . Equally clearly, community colleges disproportionately serve the poor, minorities (and therefore single-parent families), and the educationally ill-prepared. The path from poverty to middle class is becoming more difficult. There is considerable evidence of the decline of the middle class. Increasingly, community colleges will by serving those who have little hope . . . (p. 16).

Effect of unemployment on community college enrollment

The prevailing wisdom in community college enrollments is that they run countercyclical to the national economy: in poor economic times, enrollments jump as displaced workers seek career retraining (Pennington and McGinty, 2002). Their national

study of community college enrollments showed that factors such as unemployment rates, gross domestic product (GDP), and personal consumption expenditures are reliable indicators of trends in community college enrollments. The consumer price index and average hourly earnings of production workers do not correlate to enrollment changes. Citing a study conducted a quarter century ago in Arizona, researchers found a correlation between high unemployment (scarcity of jobs) with community college enrollment growth as workers retrain for jobs in growing economic sectors (p. 432).

While enlightening, Pennington, McGinty and Williams' study did not consider gross changes in an areas population as a predictor in community college enrollment. In fact, they deliberately controlled for population growth because they considered it a given, without testing for, the population versus enrollment growth correlation:

> If the population had not been controlled for . . . spuriously high positive correlation coefficients would have been obtained between the total enrollment variable and most of the economic variables. There would have been increasing values on most these economic variables, *as well as the total enrollment variable* over the time period of the study due to the increase in the U.S. population (p. 434; emphasis added).

Decision-making tools for community college administrators

According to Mann (2001), "Administrators of more effective community colleges rely more heavily upon objective data than subjective data in decision-making than do administrators of less effective community colleges."

The present study uses empirical evidence from the IPEDS database to study a relationship important to community college administrators in their plans for marketing, enrollment management and site selection.

The IPEDS database includes longitudinal data for the universe of community colleges in the U.S. for discerning enrollment trends between community colleges across state and regional boundaries. According to Schuh (2002), "IPEDS is a comprehensive federal database that includes enormous amounts of information about higher education institutions in the United States. When it's used appropriately, IPEDS can provide administrators with a wealth of data to help influence their decisions (p. 30)." The advantage of IPEDS is that it represents the universe of publicly controlled community colleges in the United States and is useful for making longitudinal comparisons over a decade or more. IPEDS data are generally reliable because they are submitted by individuals at each institution who have access to appropriate databases and methodologies (Schuh, 2002).

This study also has implications for community college site selection. Funding formulas by most states force colleges to concentrate on building enrollments, and enrollment growth is one of few positive success measures in community colleges comparative to institutions awarding baccalaureate degrees and higher. (Watson, 1989). Because property tax revenues are higher in urban areas, and community colleges in most states garner portions of funding from property taxes, one can assume urban community colleges have a funding advantage of rural locations (Friedel, in Tollefson, 1999).

Finally, enrollment growth becomes an issue in institutional sustainability and viability. Johnson (2000) wrote a dissertation concerning the funding issues in rural community colleges and the problems faced by uncertain enrollments. According to Johnson,

community colleges require enrollments of approximately 1,000 students just to cover administrative overhead costs (Johnson, 2000).

Conclusion

Based on the literature, this research study makes sense, if for no other reason than that population increase in an MSA has not been isolated as a factor contributing to community college enrollment increases (Pennington, McGinty and Williams, 2002). The articles by Levin (1998), McIntyre (1999) and Johnson (2000) indicate that such a relationship may exist. Chapters 3 and 4 will present the methodology and results of a statistical study to determine if the relationship does, in fact, exist.

CHAPTER 3. METHODOLOGY

Introduction

The purpose of this study was to examine the relationship between population growth in a community and enrollment growth in community colleges located in those communities. Based on U.S. Bureau of the Census data for population growth between 1990 and 2000, and further defined by based the Social Science Data Analysis Network CensusScope (2002), MSAs were categorized in two groups: fast-growth and slow-growth. The census data track changes in population in metropolitan statistical areas (MSAs), a clustering technique used by census demographers to track population and demographic patterns in incorporated cities and suburban areas. In this study, MSAs were categorized between small/rural (fewer than 50,000 residents), medium cities (50,000 to 500,000 residents) or large cities (500,000 or more residents) in order to examine the relationship between community population and community college enrollment growth.

Community college enrollment was measured for the period 1990 to 2000 from data collected from the United States Department of Education's Integrated Postsecondary Education Data System (IPEDS).

The study was a non-experimental, correlational design to examine a relationship or correlation between two samples of MSAs and community colleges, shown in Appendices A and B.

Assumptions

The first assumption tested was that there is statistical significance between the mean population growth between the fast-growth and slow-growth MSA groups. This was accomplished by an ANOVA test.

The second assumption was to test the hypothesis that community colleges in the fast-growth MSA group had statistically significantly higher enrollment growth than community colleges in the slow-growth MSAs. This can only be accomplished by rejecting the null hypothesis, which states that no such difference exists. An ANOVA tested the means of the two groups.

The third assumption was that there is a statistically significant correlation between population increase and community college enrollment growth within an MSA. A correlation test was run to seek such a correlation.

Descriptive and inferential statistical results of these analyses are presented in Chapter 4.

Sample selection

The two groups of metropolitan areas (fast-growth and slow-growth) were derived from U.S. Bureau of the Census data from the 2000 census, and described in Fetto (2003). The 28 fast-growth category communities and 30 slow-growth communities represent the extremes of the growth rates for MSAs in the United States.

Each MSA in the two groups was matched with one or more comprehensive community colleges that serves all or part of the population within that MSA. The community colleges were identified in Peterson's Two Year Colleges 2003 (p. 29-54).

Colleges were selected that meet Cohen and Brawer's (1995) definition for a comprehensive community college. Some communities in the fast-growth categories (Phoenix, Dallas and Houston) were assigned more than one college to mitigate the effect of studying a college district instead of individual colleges (Johnson, 1999).

Thirty community colleges (N = 30) were identified for the slow-growth category and 37 (N = 37) for the fast-growth category.

The IPEDS data base

Enrollment change data for each college were obtained from the IPEDS database and downloaded into a Microsoft Excel spreadsheet. The categories within IPEDS are:

Control of institution: public

Carnegie classification: associate of arts colleges

Highest degree awarded: associate

Enrollment: total men and total women

Total enrollments for each college were derived by adding the total enrollment of men and women for each college, from data collected for 1990 and 2000 fall semesters. The difference between 1990 and 2000 total enrollments was expressed as a percentage for each college in the sample.

Because IPEDS collects data within a consistent and well-defined data over a 20-year period, it may be considered an accurate and reliable database for inter-institutional research studies (such as this one) representing multiple states (Johnson, 1999).

Statistical procedures

The population changes represented in the fast-growth and slow-growth MSAs were compared using an ANOVA test to verify that there is statistically significant difference between the means of the two groups. Then, the mean enrollment growth (both positive and negative growth) in community colleges located within the two groups of MSAs was compared tested through a second ANOVA. Both ANOVA runs were calculated using the Statistical Package for the Social Sciences (SPSS) software package. An ANOVA is an extension of the T test and allows, in this case, to make a more robust probability statement (Macmillan and Schumacher, 1997) about the means of two groups by analyzing the variance within each group. A calculated p value will provide a basis of accepting or rejecting the null hypothesis at a standard acceptance level of greater or less than 0.05. If the p value is smaller than 0.05, the null hypothesis is rejected.

The final statistical test is a correlation analysis to study the degree to which population changes in an MSA affect community college enrollments. This study also will be conducted using SPSS. The results will be expressed as a Pearson correlation and a level of significance.

CHAPTER 4. ANALYSIS OF DATA

Introduction

The purpose of this analysis was to investigate the relationship between population change and community college enrollment change within selected MSAs from across the United States. Based on the review of relevant literature, there is sufficient evidence to suspect a positive correlation between MSA population increase and enrollment increases in community colleges located within, and serving students drawn from, the MSA.

The null hypothesis stated, "There will be no statistically significant differences in the mean enrollment growth over the period 1990 to 2000 for community colleges in fast-growth MSAs versus community colleges in slow-growing MSAs." The alternate hypothesis stated, "Community colleges located in fast-growing MSAs will show larger increases in enrollment over the period 1990-2000 than community colleges located in slower-growing MSAs." The null hypothesis will be rejected if the results of the ANOVA show a p value less than the generally accepted 0.05 level (Macmillan and Schumaker, 1997).

The MSAs and community colleges compose a sample of states ($n = 25$) sufficient for a representative sample of the 50 states.

Sample

A group of 30 community colleges located within MSAs identified as slow-growth areas were selected, and compared to a group of 37 community colleges located in fast-growth MSAs. The second group is larger because there are multiple colleges selected from certain large MSAs. There is a significant sample size (30 or more) in each group to make a

meaningful statistical comparison of the mean enrollment growth for each group (Macmillan and Schumaker, 1997). Within each of the two groups, distinctions were made between small-, medium- and large-sized cities, as defined in Chapter 1.

The two population growth categories represent the 28 fastest-growing MSAs as determined by the U.S. Bureau of the Census between 1990 and 2000, and 30 of the 42 slowest-growing MSAs. Twelve slow-growth MSAs were not included because there is no comprehensive community college located within them.

Community college enrollment data for each community college in both samples were derived from IPEDS data by subtracting Fall 1990 enrollment totals from Fall 2000 enrollment totals.

Descriptive statistics

A cursory examination of the data, again, appears to warrant the study between fast-growth and slow-growth community colleges. Figure 1 shows a box plot of the population growth between the two sets of MSAs. Twelve of the 30 community colleges in the slow-growth group showed a decrease in enrollment between 1990 and 2000, while only three of 37 decreased in the fast-growth group. Further, certain colleges in fast-growth states Utah and Nevada grew by more than 100 percent, while colleges in the rust belt states of Pennsylvania and Michigan decreased by more than 20 percent.

Table 3-1 presents the mean population change and standard deviation within each of the two sample groups, the states represented in each sample, the mean community college enrollment growth and standard deviation within each group.

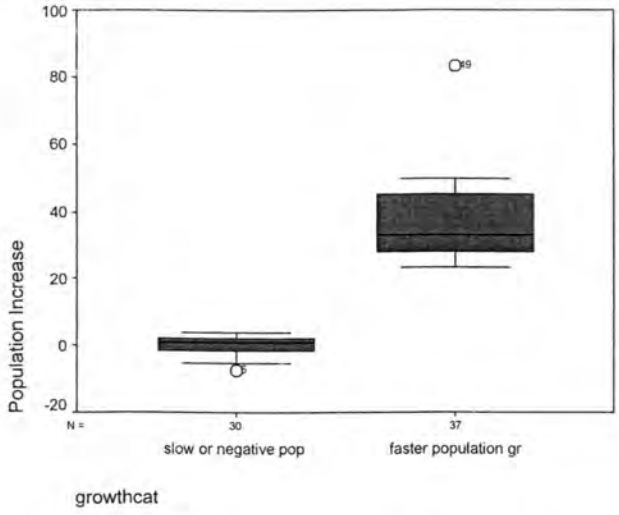

Figure 1. Range and Mean Population Change Between Slow-Growth and Fast-Growth MSAs

Figure 2 shows a box plot of the number, range and mean of enrollment change between the two groups.

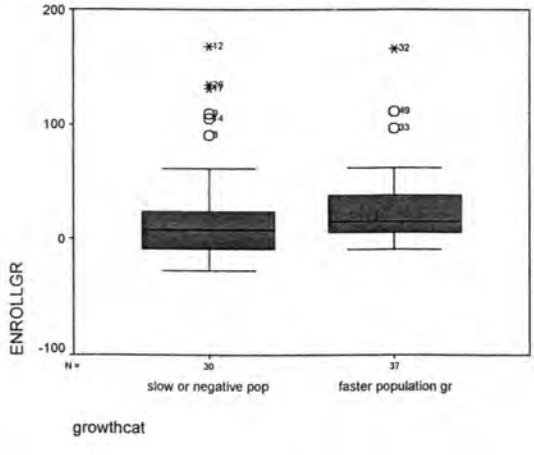

Figure 2. Range and Mean Enrollment Change Between Community Colleges Located in Slow-Growth and Fast-Growth MSAs

Table 3-1. Data Comparing Population Growth and Community College Enrollment Growth in Fast-Growth and Slow-Growth MSAs

Population Classification	Community Colleges in Sample	States Represented in Group	MSA Size	Mean Population Increase (%)	Population Change Std. Deviation	Mean Community College Enrollment Growth (%)	Community College Enrollment Growth Std Deviation
Fast-Growth (Appendix A)	N = 37	AZ, CO, FL, GA, NV, NM, NC, OR, TX, UT, WA	Large and Medium Cities	35.973	11.4905	27.4765	35.8118
Slow Growth (Appendix B)	N = 30	AL, AR, CT, IN, IA, MD, MA, MI, NY, NC, OH, PA, VA, WV	Large, Medium and Small Cities	5.33	2.8897	26.0550	53.3289

Inferential statistics: ANOVA and correlation analyses

Three statistical tests of the data were performed. The first analysis was a one-way ANOVA test to verify that there is a statistically significant difference in population growth between the fast-growth and slow-growth groups of MSAs. Had no significant difference been found, the second ANOVA would not have been conducted, since the hypothesis states that there is a difference between the two groups of MSAs. The second test was an ANOVA to test for statistically significant differences in community college enrollment growth for colleges located in the fast-growth and slow-growth groups (assuming a statistically significance difference was found in the first ANOVA). The third test was an analysis seeking the degree of correlation between MSA population growth and community college enrollment growth.

ANOVA tests

The mean population increase between 1990 and 2000 of the groups of slow-growth MSAs is 5.33 percent, versus fast growth MSA increase of 35.973 percent. The two means are statistically significantly different with a calculated p value of less than .001; a value of $< .05$ is considered significant.

The result of the first ANOVA validates the next step of the investigation: A second ANOVA to seek statistically significant differences in enrollment growth (positive or negative) between community colleges located in the fast-growth and slow-growth groups. This ANOVA will either accept or reject the null hypothesis, which states there will be no significant difference.

A one-way ANOVA compared the means of enrollment growth between the community colleges in the fast-growth versus slow-growth groups; the results are presented in Table 2.

An ANOVA is based on three assumptions: (1) independence of variables, (2) equality of variance between the means of the groups, and (3) normality of distribution within each group. In the ANOVA tests for the homogeneity of variances, an abnormally high standard deviation and Levene statistic – the measure of equality of variance between the two groups – rejects the equality of variances assumption. If the Levene statistic is <.05, then the variances are unequal, violating one of the three assumptions of an ANOVA (Hinkle, Wiersma and Juls, 1998).

The ANOVA results for the population-versus-enrollment study are shown in Table 3-2. The format follows the conventions for reporting ANOVA results from Hinkle, Wiersma and Juls, (1998).

The p value of .909 calculated through the ANOVA indicates a great similarity between the means of the two groups of community colleges. The null hypothesis is therefore not rejected, which means there is no statistically significant difference in enrollment growth between the two groups of community colleges. The large standard deviation and Levene statistic of 6.565 do not meet the equality of variances assumption. Although the mean enrollment growth for the fast-growth group (27.4765 percent) is larger than that of the slow-growth group (26.0550), there is not a statistically significant difference between the two, leading to the conclusion that population increase in an MSA is not a significant predictor of community college enrollment increase.

Table 3-2. ANOVA Results Comparing Community College Enrollment Growth Between Fast-Growth and Slow-Growth MSA Groups

Source	Sum of Squares	Degrees of Freedom	Mean Square	F	p
Treatment Between Fast-Growth And Slow-Growth Groups	26.274	1	26.274	.013	.909
Error Within Each Group	128,935.45	65	1983.622		
Total	128,961.72	55			

Correlation analysis

The third test looked for correlation between population growth and community college enrollment growth (Macmillan and Schumacher, 1997).

The goal of the study was to identify if population growth in an MSA can be shown to be statistically correlated to community college enrollment growth. As shown in Table 3, there are no significant Pearson correlations between population growth and enrollment change.

Table 3-3. Correlations Between Population Growth and Enrollment Growth (N=67)

	Growth Category	Population Increase	Enrollment Growth
Population Increase			
Pearson Correlation	.887		
Significance (2-tailed)	.000		
Enrollment Growth			
Pearson Correlation	.014	.107	
Significance (2-tailed)	.909	.390	

Interpretation

The first ANOVA test did establish statistically significant differences between fast-growth and slow-growth MSAs. The second ANOVA did not reject the null hypothesis, which states there would be no difference between the two groups of community colleges. A Pearson correlation statistic of correlation between the population growth and enrollment increase is 0.14, where 1.0 would show a perfect positive correlation. It is therefore concluded that there is no statistically significant difference in mean enrollment growth in community colleges located in either fast-growth or slow-growth MSAs.

The significance of 0.39 shown in Table 3 means the 0.14 Pearson correlation would only be true in 39 percent of the cases. The correlation between a MSAs population growth and a community college's enrollment growth is extremely weak.

CHAPTER 5. SUMMARY, DISCUSSION AND RECOMMENDATIONS

Conclusions

This study did not establish a statistically significant relationship between MSA growth and community college enrollment growth. This study was based on a casual (not causal) glimpse at the fact that a small set of fast-growing community colleges are located in the fastest-growing MSAs in the United States, and there was significant enrollment loss in a small set of community colleges in slower-growing MSAs. But after enlarging the study to include a nationally representative sample of community colleges located in MSAs representing a range of population demographic changes in the U.S., the casual glimpse did not prove to be a causal relationship Nevertheless, this study is one of few studies found in literature that attempts to quantify the macro-environment of community college enrollment patterns in the United States. Despite the fact that the hypothesis was not proven – by a large measure, in fact – the study was not entirely without merit, and brings to bear many additional questions worthy of future review in the emerging sub-category of community college studies within the larger field of postsecondary education research.

Based on the research and supporting literature review within this study, the following conclusions can be made:

1. The study contributes to the knowledge and research base on community college issues. In Johnson (2000) it was noted that in the literature of the study of postsecondary education, very little research has been published on community colleges, particularly in areas such as site selection, enrollment patterns and finance.

2. This study also is useful in future studies to expand the taxonomy of community colleges within the IPEDS database. According to Johnson (2000), "Katsinas (1996) noted, "there are eight separate and distinct subcategories for four-year institutions within the Carnegie classifications. Yet all community colleges are aggregated into a single category, "Associates Colleges." There are great differentiations in size and mission between rural, urban, suburban and technical colleges.
3. The study adds to quantification of community college enrollment trend data of Pennington, McGinty and Williams (2002). Their study did not include the effects of population increase on community college enrollments. The present study clearly shows that MSA population, in the sample selected, had no significant effect on enrollment increases.

Discussion

The principal investigator in this survey is employed as a marketing director for a community college district serving a moderately fast-growing metropolitan areas as well as rural communities experiencing inexorable losses in population. A trend was noted that enrollment grew faster in the faster-growing urban area. The researcher was seeking empirical knowledge that the district was reflective of a national phenomenon.

The results of this study confirm that improved marketing and recruitment continue to important tools for community college management. Had this study found a positive correlation factor between MSA growth and enrollment growth, then further research would be warranted to determine the impact on enrollment of the sophisticated marketing and positioning strategies used by colleges today. Since this study did not reject the null hypothesis and did not find such a correlation, it can be concluded that demographics are

only one of myriad factors to consider in recruitment marketing. According to Kotler and Fox (1995), institutions must evaluate their "macroenvironment," which "consists of large-scale fundamental forces that shape opportunities for and pose threats to the institution – demographic, economic, ecological, technological, political and cultural forces (p. 97)."

The empirical evidence discovered in this study indicate that, while population demographics can still be a consideration for locating community college campus sites, the decision is much more complex than merely locating in a fast-growth area. Further studies should focus on the immigrant population, workforce needs and employment levels, curriculum tied to local economy, the impact of distance education, competition in the higher education marketplace, and the effects of proximity to four-year institutions to the community college.

Recommendations for further study

The first recommendation based on this study is to study the universe of community college enrollment trends instead of a sample. Johnson (2000) described the difficulties faced by rural community colleges in sustaining their enrollment base. A study of all community college enrollments could elicit trends based on degree of degree urbanization of the service area. The access to this data through IPEDS would facilitate such a study. Additional comparisons of community college enrollment growth rates with other demographic criteria may also contribute to the knowledge of community college enrollment as a management issue. These analyses could include:

Population size factors. As suggested by Johnson (2000), community colleges in rural areas show both lower enrollments and lower rates of enrollment growth, compared to

colleges in urban and suburban areas. A further study could isolate the effect of the size of the MSA on community college enrollment patterns.

Employment factors. Rooney (2002) and Cohen and Brawer (1996) describe the positive correlation between unemployment rates and increases in community college enrollments. A further study could examine the effects of unemployment rates, industry mix (for example, service-sector employment, manufacturing and technology-related employment), and the types of employment within the community college's service area.

Income factors: Levin (1998) suggests the stratification of postsecondary education among lines of household income demographics. A further examination of community college enrollments with household income levels within a MSA could yield a correlation in stratification levels between low, middle, and high-income households and their attendance in, respectively, community colleges, public universities and private colleges.

Competition factors: Community colleges exist in a competitive education marketplace (Kotler, 1995). A further study could examine the relationship between the number and variety of postsecondary institutions in a MSA and the effect of this competition on community college enrollment.

Community colleges will need to adapt to changing demographics and increasing competition from for-profit institutions like the University of Phoenix and even the corporations who traditionally do not provide an accredited educational product. According to Doucette (1997), knowledge-rich corporations like Disney and Microsoft already offer "high quality, accredited, college-level courses and programs to most homes and businesses." In Iowa, companies like Pioneer (backed by the financial resources of the DuPont

Corporation), John Deere and others have the facilities and capital to create educational and training programs for their own employees as well as employees of other companies.

A useful analogy is to look at parallels in other industry sectors: (1) John Deere faced rising health care costs, so they internalized their health care insurance plans; now providing health care plans for other companies is a vital and profitable part of Deere's product mix. (2) General Electric and General Motors and other automotive companies have established profitable niches in the finance sector.

What do these examples have to do with the study at hand? The idea that community colleges must examine every possible market factor to maximize their enrollments and maintain their service bases.

Effect of minority populations on community college enrollment: Murdock and Hoque (1999) believe the rate of population increase in the U.S. will slow in the decades ahead, but that the greatest share of that increase will come from minority populations. The implications for higher education planners are profound:

> First, slower rates of population growth point to slower growth in markets for all goods and services, including educational services. Thus the declining rate of population growth is likely to lead to reduced rates of growth in the total number of potential students (p. 8).

The growth in college-age populations in the future will come from minority students, because "an absolute decline of nearly 1.4 million students is projected in the number of Anglo students" between the years 1990 and 2050 (p. 9).

Finally, Blau, McVeigh and Land (2000) suggest that community colleges increasingly are serving as a "feeder" system for public baccalaureate-granting institutions.

Cohen and Brawer (1996) clearly describe the community colleges' role in providing the freshman and sophomore years of general instruction that readily transfers to other postsecondary institutions. There is evidence that the proximity of a public university may positively impact enrollments in community colleges. This is certainly the case in Iowa, for example, where Hawkeye Community College, near the University of Northern Iowa, showed one of the fastest rates of growth despite being located in one of the slowest-growing MSAs in the country.

Conclusion

Despite the fact that this study did not correlate population growth to enrollment growth, it does contribute to the literature and knowledge base of community college research. Community college enrollment trends depend on the interrelationship of complex factors. Addressing this relationship through the recommendations herein would give community college administrators better tools for predicting and managing their enrollment base.

APPENDIX A. METROPOLITAN STATISTICS AREAS (MSA) AND COMMUNITY COLLEGES REPRESENTING FAST-GROWTH POPULATIONS

Size Code	Metropolitan Statistical Area	State	Population Change, 1990-2000	Community College	Enrollment Change, 1990-2000
1	Las Vegas	NV	83.30%	CC of Southern Nevada	111.18%
2	Yuma	AZ	49.70%	Arizona Western College	6.17%
2	McAllen	TX	48.50%	CC of South Texas	-2.82%
1	Austin	TX	47.70%	Austin CC	6.12%
1	Phoenix-Mesa	AZ	45.30%	Glendale CC	8.53%
1	Phoenix-Mesa	AZ	45.30%	Gateway CC	15.75%
1	Phoenix-Mesa	AZ	45.30%	Mesa CC	15.15%
1	Phoenix-Mesa	AZ	45.30%	Phoenix CC	3.51%
1	Phoenix-Mesa	AZ	45.30%	South Mountain CC	6.87%
1	Phoenix-Mesa	AZ	45.30%	Paradise Valley CC	25.97%
2	Laredo	TX	44.90%	Laredo CC	42.92%
2	Provo-Orem	UT	39.80%	Utah Valley State College	165.85%
1	Atlanta	GA	38.90%	Atlanta Metropolitan College	17.72%
1	Raleigh-Durham-Chapel Hill	NC	38.90%	Wake Technical CC	57.51%
2	Wilmington	NC	36.30%	Cape Fear CC	96.55%
2	Fort Collins-Loveland	CO	35.10%	Front Range CC	33.55%
2	Orlando	FL	34.30%	Valencia CC	49.50%
2	Reno	NV	32.90%	Truckee Meadows CC	1.98%
2	Ocala	FL	32.90%	Central Florida CC	5.61%
2	Fort Myers	FL	31.60%	Edison CC	0.00%
2	Bellingham	WA	30.50%	Whatcom CC	41.93%
1	Denver-Boulder-Greeley	CO	30.40%	CC of Denver	16.66%
2	Colorado Springs	CO	30.20%	Pikes Peak CC	28.36%
1	Dallas-Ft Worth	TX	29.30%	North Lake College	37.12%
1	Dallas-Ft Worth	TX	29.30%	Tarrant County College	4.59%
2	Charlotte-Gastonia	NC	29.00%	Central Piedmont CC	-8.60%
2	Brownsville-Harlingen	TX	28.90%	Texas Southmost College	37.99%
2	Richland-Kennewick-Pasco	WA	27.90%	Columbia Basin College	-2.24%
2	Tucson	AZ	26.50%	Pima CC	2.39%
1	Portland-Salem	OR	26.30%	Portland CC	10.60%

1	Portland-Salem	OR	26.30%	Mt. Hood CC	14.39%
2	Santa Fe	NM	26.30%	Santa Fe CC	33.36%
1	Houston-Galveston	TX	25.20%	North Harris CC	56.86%
1	Houston-Galveston	TX	25.20%	Galveston College	6.27%
1	Houston-Galveston	TX	25.20%	Houston CC	12.33%
1	Salt Lake City	UT	24.40%	Salt Lake CC	61.84%
2	Daytona Beach	FL	23.50%	Daytona CC	-4.84%

APPENDIX B. METROPOLITAN STATISTICS AREAS (MSA) AND COMMUNITY COLLEGES REPRESENTING SLOW-GROWTH POPULATIONS

SizeCode	Metropolitan Statistical Area	State	Population Change, 1990-2000	Community College	Enrollment Change, 1990-2000
2	Steubenville-Wierton	OH	-7.40%	Jefferson CC	-9.08%
2	Utica-Rome	NY	-5.30%	Mohawk Valley CC	21.26%
2	Binghampton	NY	-4.60%	Broome CC	-11.97%
2	Wheeling	WV	-3.80%	West Virginia Northern CC	-13.80%
2	Johnstown	PA	-3.60%	Cambria County Area CC	109.52%
2	Decatur	IL	-2.10%	Richland CC	-14.68%
2	Buffalo-Niagara Falls	NY	-1.60%	Erie CC - City Campus	1.98%
1	Pittsburgh	PA	-1.50%	CC of Allegheny County	-24.31%
2	Pine Bluff	AR	-1.40%	Southeast Arkansas College	167.81%
2	Syracuse	NY	-1.40%	Onondaga CC	-5.50%
2	Muncie	IN	-0.70%	Ivy Tech State College - Northwest	105.40%
2	Dayton-Springfield	OH	-0.10%	Sinclair CC	16.25%
2	Jacksonville	NC	0.30%	Coastal Carolina CC	11.57%
3	Cumberland	MD	0.40%	Allegany College of Maryland	-2.19%
2	Toledo	OH	0.70%	Owens CC	131.08%
2	Benton Harbor	MI	0.70%	Lake Michigan College	-0.32%
2	Springfield	MA	0.70%	Springfield Technical CC	14.30%
2	New London-Norwich	CT	1.00%	Three Rivers CC	11.90%
2	Mansfield	OH	1.00%	North Central State College	23.65%
2	Terre Haute	IN	1.10%	Ivy Tech - Wabash Valley	60.63%
3	Danvillle	VA	1.30%	Danville CC	7.02%
2	Albany-Schenectady-Troy	NY	1.60%	Hudson Valley CC	-1.03%
2	Davenport	IA-IL	2.30%	Eastern Iowa CC	7.57%
1	Cleveland	OH	3.00%	Cuyahoga CC	-15.71%
3	Dubuque	IA	3.20%	Northeast Iowa CC	90.27%
2	Rochester	NY	3.40%	Monroe CC	13.07%
2	Waterloo	IA	3.40%	Hawkeye CC	134.26%
2	Lansing	MI	3.60%	Lansing CC	-28.34%
3	Gadsden	AL	3.60%	Gadsden State CC	-12.61%
2	Champaign	IL	3.80%	Parkland College	-6.35%

REFERENCES

Atwell, R. and Pierce, D. (1995). American community colleges: a guide. American Council on Education, Oryx Press, 1995.

Blau, J., and McVeigh R. The expansion of two-year colleges: a dynamic, multi-level model. Community College Journal of Research and Practice, Volume 42, Issue 2, February 2000, p. 127.

Camarota, S. (2001) Immigration and Naturalization Services, 2000 INS statistical yearbook, immigration in the United States 2000: a statistical snapshot. U.S. Census Bureau.

Carnevale A. and Fry R. Economics, demography and the future of higher education.

Cohen A. and Brawer B. (1996). The American community college. San Francisco, Jossey-Bass.

Doucette D. (1997). The community college niche in a competitive higher education market. League for Innovation in Community Colleges, Leadership Abstracts 10(2), www.league.org/publication/abstracts/leadership/labs0297.htm (accessed March 8, 2003).

Drucker, P. (1997). The future has already happened. Harvard Business Review 75(5), 20-24.

Evelyn, J. (2001). Many community colleges report a boom in their enrollments. Chronicle of Higher Education, October 19, 2001, A36.

Evelyn, J. (2002). For many community colleges, enrollment equals capacity. Chronicle of Higher Education, April 26, 2002, A41.

Glaeser, E. (2001). City growth and the 2000 census: which places grew, and why. Center on Urban and Metropolitan Policy, The Brookings Institution.

Fetto J. (2003) Leaps and Bounds: Fastest growing metropolitan areas in the U.S. between 1990 and 2000. American Demographics 25(1), 8-9.

Friedel, J. in Tollefson, T (1999). Fifty state systems of community colleges: mission, governance, funding and accountability. Johnson City, TN: Overmountain Press.

Frey. W. (2003).Married with children. American Demographics 25(2), 17-19.

Glaeser, L. (2001). City growth and the U.S. census: which places grew, and why. Cambridge, Massachusetts: Harvard University and The Brookings Institute, Survey Series.

Hinkle, D., Wiersma, W. and Jurs S. (1998). Applied Statistics for the Behavioral Sciences. Boston: Houghton Mifflin Company, 345-367.

Johnson, J. (2000). A study of institutional capacity and financial base at rural community colleges. Dissertation, University of Toledo.

Keller, G. The new demographics of higher education. Review of Higher Education, Spring 2002. Volume 24 (3) 219-235.

Katsinas S. and Lacey V. (2000). A classification of two-year institutions of postsecondary education: a technical report. Education Commission of the States, 19.

Kotler P. (1995) Strategic marketing for educational institutions. . Upper Saddle River, NJ: Prentice Hall Publishers.

Lackey, G.H. and Rowls, M.D. (1989). The wisdom in education: the views of Ralph Tyler. Columbia: University of South Carolina.

Levin, B. (1998). Where we're going: what we need to know about the world past Y2K. Paper presented at the Annual Conference of the Southeastern Association of Community College Research.

Mann, B. (2001). Community college effectiveness: does data make a difference? Doctoral dissertation, University of Missouri-Kansas City.

McIntyre, C. (1999). Enrollment simulation and planning. American Association of Community Colleges. Washington, DC: Community College Press.

McMillan J. and Schumacher S. (1997). Research in education: A conceptual introduction. New York: Addison Wesley Longman Publishers.

Murdock, S. and Hoque, M. (1999) Demographic factors affecting higher eduction in the United States in the twenty-first century. New Directions for Higher Education 108: 5-13.

National Center for Education Statistics (2000). Projections of Education Statistics to 2010. Washington, D.C.: U.S. Department of Education, Office of Educational Research and Improvement, 25-27, 48.

Pennington, K., McGinty, D. and Williams, M. (2002). Community college enrollment as a function of economic indicators. Community College Journal of Research and Practice. 26: 431-437.

Pierce, D. (1999). The nation has discovered community colleges. Community College Week 11(18).

Rooney M., "A surge of students," Chronicle of Higher Education, Volume 49, Issue 10, page A33, November 1, 2002.

Shaw, R., Alspaugh, J., Wat-Aksorn, P. (1997). Accuracy of enrollment forecasting methods. Boston: New England School Development Council, ERS Spectrum, 16-19.

Schuh, J. The integrated postsecondary data system, in Using Benchmarking to Inform Practice in Higher Education. Number 118, Summer 2002. San Francisco: Jossey-Bass, 2002.

Sheaff, K. "The 2000 census and growth patterns in rural America," Center for the Study of Rural America, Federal Reserve Bank of Kansas City.

Social Science Data Analysis Network CensusScope (2002). States ranked by rate of population growth, 1990-2000. Ann Arbor: University of Michigan, Social Science Data Analysis Network, www.censusscope.org/us/rank_popl_growth.html (accessed April 17, 2003).

Swail, W. (2002). Higher education and the new demographics. Change 34(4), 14-23.

Szelenyi, K. (2002). Educating immigrants: the community college role. Community College Review 30(2), Fall 2002.

United States Department of Education (1997). Hispanic-serving institutions, summary for 1996-1997. White House Intitiative on Educational Excellence for Hispanic Americans.

Vanderlinden, K. (2002). Credit student analysis, 1999 and 2000. Faces of the future: a portrait of America's community college students. Iowa City: ACT, Inc.

Wolf, L. Des Moines Area Community College spring 2003 enrollment report (unpublished report).