

Demographic Shift and its Potential Effect on Higher Education

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Abstract

With the aging of Baby Boomers, which represent 76 million people in United States or 1/4 of the overall population in this country, it creates wide-ranging implications for virtually every facet of American society. On par with the aging baby boomers is the growing population of minorities. Today in many places including the densely populated states of California and Texas, non-Hispanic whites have become the minority, and the bulk of minority students including Hispanics are further concentrated in the younger grades. Many minority families do not have access to information about the educational system in a way that helps support their children to be successful in the U.S. school system. The gap is further widen among financially disadvantaged students. Today, completing a higher education not only means the enhancement of social status, but also means a better financial capability in the computerized society. When an economic underclass becomes the majority, the class division between the embarrassingly wealthy and the unacceptably poor not only will cause alienation, resentment, and social unrest, but also will affect the sustainability of prosperity. Considering the rapid minority population growth and minority-majority flip tendency, the significance of young minorities for the growth and vitality of our economy needs to be particularly recognized.

Soaring Minority Population

With the gradual retirement of Baby Boomers, which represent 76 million people in United States or 1/4 of the overall population in this country, it creates wide-ranging implications for virtually every facet of American society (Pollard, 2014). On par with the aging baby boomers is the growing population of minorities. In the past decade, Hispanics grew by 15 million people, or 43%. The African-American and Asian-American populations each increased by more than 4 million, with growth rates of 12% and 43%, respectively. Non-Hispanic whites made up 75% of the population in 1990, its proportion dropped to about 70% in 2000, and further down to 63% in 2012. If the changing trend continues as of the past two decades, non-Hispanic whites will be outnumbered by minorities in 2035. Today in many places including the densely populated states of California and Texas, non-Hispanic whites have become the minority (ESRI, 2012). As shown in Fig. 1, the momentous demographic shift of United States will continue to have a dramatic effect on business, lifestyle, and culture. For the children under age 18 nationwide, this minority-to-majority flip will happen soon. In Texas, the 2014 high school graduation seniors is the last crop without a majority of Hispanic students, they are also the last crop without a majority of students from financial disadvantageous background (Smith, 2013). And the bulk of minority students including Hispanics are further concentrated in the younger grades.

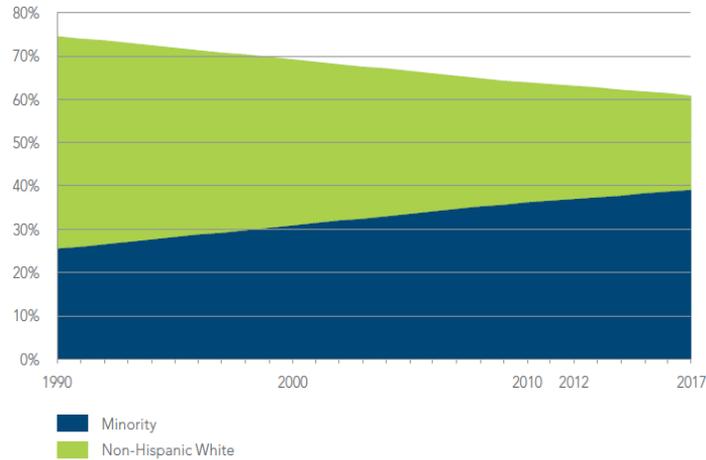


Fig. 1. Demographic Shift in the National Population (ESRI, 2012)

Research indicates that there is a connection between parents' social-economic status and their children's achievements in education and profession. Consequently the social-economic disparities are often passed onto the next generation. Many minority families do not have access to information about the educational system in a way that helps support their children to be successful in the U.S. school system (American Psychological Association, 2012). In Texas, Latino children drop in 12-th grade at 35% in Texas, significantly higher than other groups (Texas State Data Center, 2014). Among Hispanic students graduated from high school, fewer are prepared for college. In 2011, only 42% met college readiness benchmarks in both English and Math, compared with 65% of Anglo students. The gap is further widen among financially disadvantaged students that only 38% are qualified as "college ready" in the college entrance exams (Smith, 2013). Since many minority students are not prepared for college academically and/or financially, they may choose to work directly after high school or even earlier. The observation can be confirmed in the following Fig. 2 regarding the ethnic composition of Texas labor force.

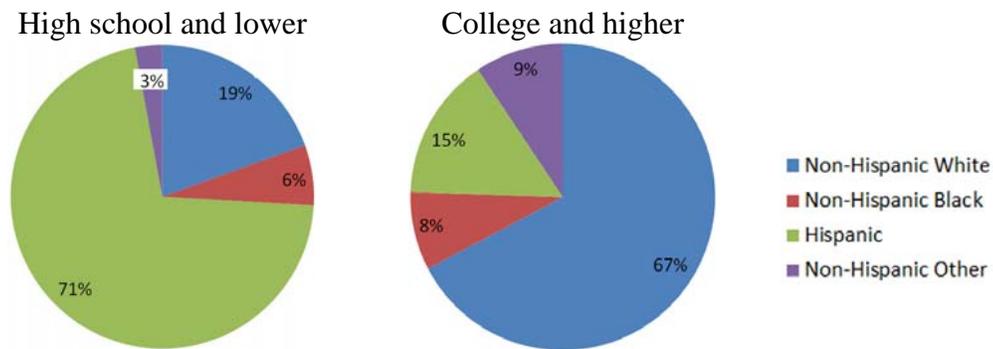


Fig. 2. Ethnic Composition of Texas Labor Force (Texas State Data Center, 2014)

Instead of contributing robustly to the national economy, underachieved minorities will generate little wealth, few jobs, low tax revenues, and lead to fiscal burdens to the whole society. This is not the case that underrepresented minorities need to be helped so that they can be elevated at the expenses of other groups, but U.S. future national competitiveness will largely depend on the quality of its future minority-dominated workforce. The success of minority

participation in today's knowledge economy is therefore a national priority, and needs to be treated as such (Greenhalgh, 2014).

Why Higher Education?

Today, completing a higher education not only means the enhancement of social status, but also means a better financial capability to support the individual family as well as the welfare system. As shown in Fig. 3, the individual person's earning is highly correlated with education level. Compared with high school graduates, bachelor degree recipients lifetime earning is 65% higher; associate degree recipients lifetime earning is 27% higher. In addition, the unemployment rate for individuals with at least a bachelor's degree has consistently been about half of the unemployment rate for high school graduates. It indicates employees completed higher education with current technical skills and lifelong learning capability are much more valuable to the employers and in return, could command higher levels of compensation and stability.

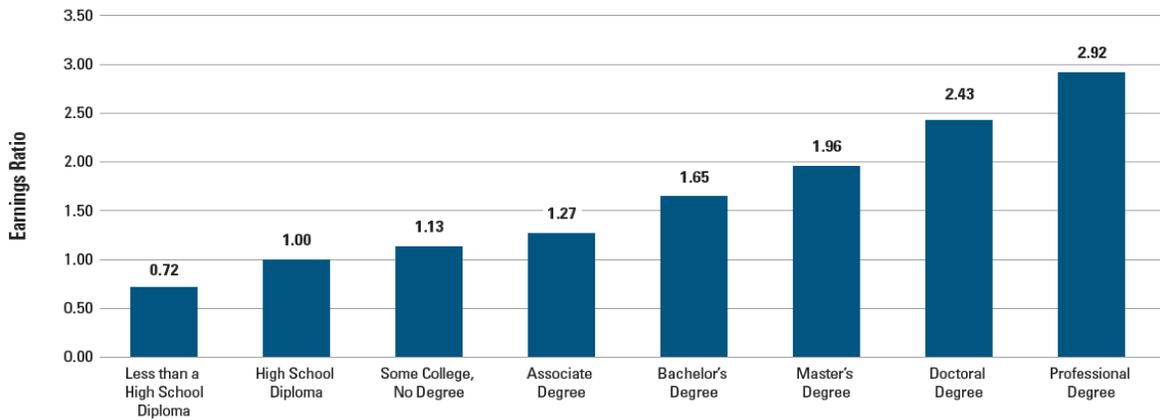


Fig. 3. Expected Lifetime Earnings Relative to High School Graduates by Education Level (Baum, 2013)

Higher education plays a critical role for those students from low-income families to enhance their social and economic status. As indicated in Fig. 4, of adults who grew up in the bottom family income quintile, 47% of those will still remain in the bottom quintile if not finished 4-year college education; whereas only 10% of those will stay in the bottom quintile if successfully received 4-year college degree.

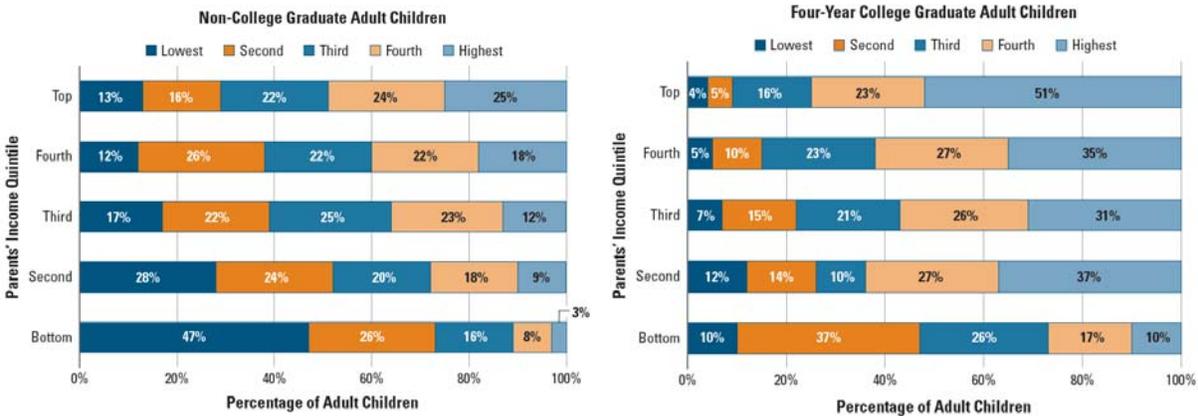


Fig. 4. Social Mobility for Adult Children Without/With 4-year Higher Education (Baum, 2013)

With increasing recognition of higher education, minority student postsecondary enrollment has achieved a steady increase in the past several decades. Considering the rapid minority population growth and minority-majority flip tendency, the significance of young minorities for the growth and vitality of our labor force and economy need to be particularly recognized. When an economic underclass becomes the majority, the class division between the embarrassingly wealthy and the unacceptably poor not only caused alienation, resentment, and social unrest, but also will affect the sustainability of economic prosperity (Greenhalgh, 2014).

Promoting STEM (Science, Technology, Engineering and Mathematics)

The innovation and advancement in Science, Technology, Engineering and Mathematics (STEM) is critical for America to ensure its leadership (Commerce Blog, 2012). Although STEM employment makes up a small fraction of total employment, only 1 in 18 workers or 7.6 million people held STEM jobs. STEM positions grew rapidly from 2000 to 2010 with 7.9% increase, while non-STEM positions grew just 2.6% over this period. It is projected that STEM jobs will continue growing 17.0% during 2008 - 2018, compared to just 9.8% for non-STEM jobs (Langdon, 2011).

Besides, workers in STEM occupations also earn more on average than their counterparts in other fields, regardless of their educational attainment. A regression analysis – which controls for a variety of demographic, geographic, industry, etc – demonstrated the salary premium in STEM fields. In addition to higher earnings, workers in STEM occupations on average experience lower unemployment rates than those in other fields. Another impressive characteristic of STEM workers is their educational attainment. More than two-thirds (68%) have a college degree or more, compared to just under one-third (31%) in non-STEM fields. Nearly one quarter (23%) have completed an associate's degree or similar. Only 9% STEM works have a high school diploma or less (Commerce Blog, 2012).

For a prospective student intends for STEM as the career plan, the analysis of the linkage between STEM jobs and STEM education indicated two patterns. Firstly, a STEM degree is the typical path to a STEM job, as more than two-thirds of STEM workers with a college degree have an undergraduate STEM degree. Secondly, STEM degree holders receive an earnings premium relative to other college graduates, whether or not they end up in a STEM job. Likewise, college graduates including non-STEM educated enjoy an earnings premium for having a STEM job. The earning premium for having a STEM job or a STEM degree is quite similar, at 13% and 11%, respectively (Langdon, 2011). Therefore, in order for underrepresented students to achieve a professional career with a decent salary through education, it is needed to investigate effective mechanisms to pipeline students including those with financial disadvantageous background into STEM fields (Bright, 2013). Such an effort is also critical for this country to sustain prosperity and ensure its leadership in the world.

As the United States seeks to fuel the future workforce in the crucial areas of STEM, it is necessary to profile the national high school student population in which 25% or over 1 million students expressed their interests in STEM careers. Since the graduating class of 2004, overall interest in STEM majors and careers among high school seniors has increased considerably, which is indicated in Fig. 5. As Engineering and Technology interest are on the rise, while interest in Science and Mathematics has decreased over the past few years (Munce, 2012). In 2012, Mechanical Engineering (20.4%) was the most popular major or career choice among

STEM-interested students. As Science & Engineering occupations are projected to grow at double the rate of the overall U.S. labor force, by 2018 the bulk of STEM jobs will be in Computing (71%), followed by traditional Engineering (16%).

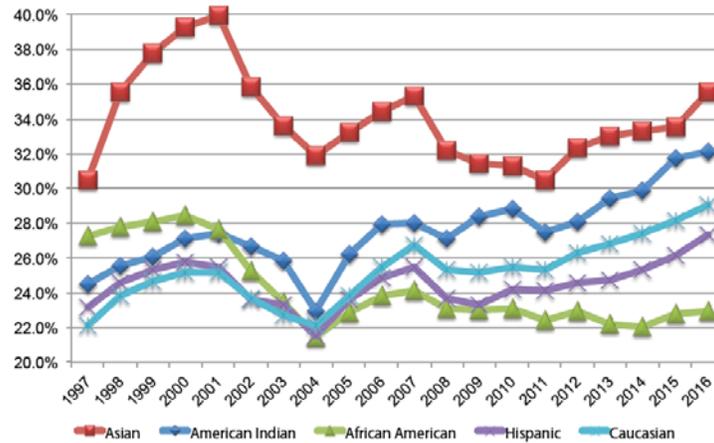


Fig. 5. National Trends for STEM Interest (Munce, 2012)

Inclusion of Underrepresented Students in STEM

The potential barriers to prevent underrepresented students to pursue STEM degrees can be summarized into two categories, academic and non-academic.

Academic Barrier: Recent research has shown that graduating with STEM major is more difficult than pursuing other fields of study (Abel, 2014), which can be greatly owed to its higher requirements on mathematics. Accordingly, many states including Texas have intensified high school math requirements to improve student readiness for higher education. High schools in low-income areas are less likely to recruit and retain high quality teachers, and low-income families are also unable or unwilling to support enhancement classes (Phelps, 2014). Consequently underachieved students are often with financial disadvantageous background.

Non-Academic Barrier: (1) Financial Burden: As with all investments, a college education requires paying some upfront costs in order to capture the expected benefits that accrue over the lifetime of the investment. The direct cost refers to tuition, textbook, etc, while the opportunity cost represents wages that could have been earned by working instead of attending college. Research indicates that financial reward significantly outweighs the cost of higher education, with an average annual return of 15% over the next decade (Abel, 2014). However, many minority students and their families just cannot afford the investment on higher education. (2) Cultural and Social Environment: Many minority and low-income students may not have the cultural knowledge or access to informal social networks to seek and acquire the necessary college related information for easier access to college participation (Gonzalez, 2003). Compared with parents with higher education, parents with less education also have fewer resources that can assist their children in achieving their educational aspirations (Auerbach, 2004). Therefore, students who did not have access to social capital early in their academic careers were often neglected in the college planning process. In addition, social-economic status of

underrepresented minorities potentially undermine a student's academic confidence, leading to underachievement (Nora, 2009).

Partnership with Neighboring Community Colleges

Financial disadvantageous students have an increasingly tough road to achieve economic stability, with less preparation to be college-ready as well as continued rising tuition for universities. Therefore, the consideration of education cost is growing in importance for the student choice. In 2011 Fall, there are 8 million students enrolled in community colleges for credit courses, in addition with another 5 million students for non-credit courses. Today 28% bachelor degree earners started at a community college and 47% took at least one course at a community college. For the plurality of minority students and the majority of low-income students, community college has been serving as a launching pad for greater educational attainment as well as related benefits of social mobility and economic security (Mullin, 2013). Meanwhile, many students still need to work part-time in long semesters and full-time in summer to support their study and living. The comparison between income and expense for community college students is indicated in Fig. 6 below.

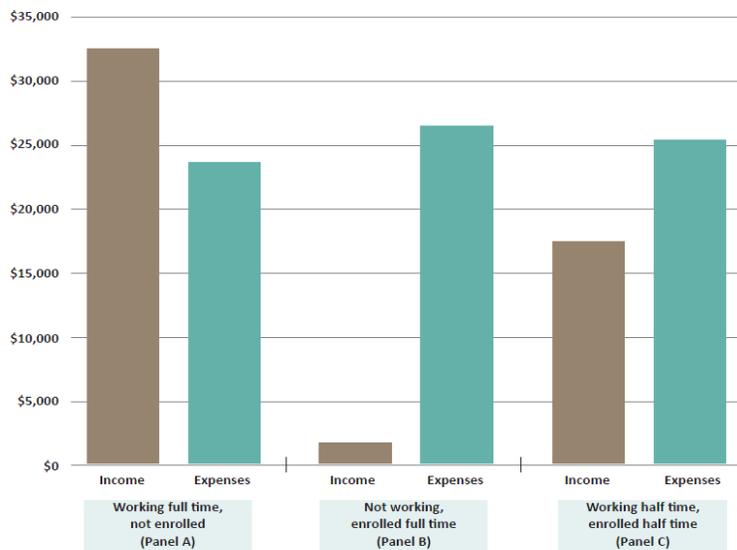


Fig. 6. Income and Expense for Community College Students (Baum, 2013)

In order to take advantage of the great pool of community students, universities may need to investigate more approaches to strengthen the connections with neighbouring community colleges. From the author's perspective, Engineering Technology (ET) is designed to provide college-educated technologists who can apply engineering principles and modern technology to support engineering process (CIEC, 2009). Due to the significant overlap in knowledge and expertise education with Engineering program, resource competition is inevitable and ET is seen to be under pressure in terms of enrollment as well as funding, research and publications (Dempsey, 2013; Ferrara, 2008; Kimble-Thom, 2005; Holling, 2003). Considering 4-year baccalaureate ET program is evolved from 2-year associate program, there is an intrinsic advantage for ET bachelor program to establish the career pathway with neighboring community colleges. Research indicates several elements of articulation and transfer policies are needed to

promote transfer success, and credit mobility is the first important factor (Mullin, 2012). Therefore, how to establish an effective partnership that college students are advised to prepare for the potential transfer towards the Bachelor study, it may be critical for ET program to take advantage of the abundant minority human resources to enhance its enrollment.

Except for the traditional approach of transferring-in, some co-enrollment programs have been developed between university and community college. For example, Houston Community College is now offering Texas A&M-Chevron Engineering Academy class. The enrolled students take most courses same as the other college students, meanwhile Texas A&M University may send their faculties to the community college to teach several certain courses for co-enrolled students. The students just need to pay the tuition as of the community college rate in their first two-year study at college. After two years, qualified students then attend Texas A&M University to finish the upper division courses, and pay the tuition as of the university rate. Such a 2+2 articulation arrangement provides an economical pathway to the Bachelor degree. However, it do need both sides to set up a delicate agreement involving many technical issues, such as tuition allocation, head count, dedicated personnel, etc.

Conclusions

The momentous demographic shift of United States will have a dramatic effect on business, culture, and education as well. Considering the rapid minority population growth and minority-majority flip tendency, the significance of young minorities for the growth and vitality of our economy need to be particularly recognized. The computerized society has been placing a higher emphasis on the importance of education. For the plurality of minority students and the majority of low-income students, community college may serve as a launching pad for greater educational attainment as well as related benefits of social mobility and economic security. University and its STEM departments may need to explore a constructive partnership with neighbouring community colleges to establish a smooth transfer pathway to improve the inclusion of underrepresented minority students.

Acknowledgment

This project is supported in part by National Science Foundation grant #1238859, Dept of Education grant #P120A140064. Opinions, findings, and conclusions or recommendations expressed in this material are those of the authors and do not necessarily reflect the views of the funding agency.

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