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"How Much Economic Value Does My Credential Have?": Reformulating Tinto's Model to Study Students' Persistence in Community Colleges

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Abstract

Community colleges play a key role in educating the large number of non-traditional, low-income, and under-prepared students who have entered higher education in the past several decades. Despite increased access, community colleges are struggling to graduate students. Most, if not all, strategies provided by scholars to improve college completion rates assume increased *student engagement* will enhance persistence and success. Existing theories of persistence overlook the dynamic influence of job markets for the students community colleges serve. Using National Center for Education Statistics and the Bureau of Labor Statistics data, this article draws on Tinto's theory of persistence and proposes a new framework that acknowledges the role of job opportunities and of work–family–schooling quandaries in community college students' choices about persistence. Our model builds on the following relevant notions: (a) human capital theory, (b) social integration, and (c) socio-academic integration. Our model has important implications for leaders who aim to better align students' college experiences with their desired careers and available jobs.

Keywords

student integration, student persistence and success, human capital, socio-academic integration, career capital

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Community colleges are at the forefront of national discussions involving U.S. economic competitiveness (D'Amico, Rios-Aguilar, Salas, & González Canché, 2012) and the academic, social, and economic benefits of enrolling and succeeding in a community college (Belfield & Bailey, 2011). Although the available scholarship estimating the returns to obtaining college education reaffirms strong positive earnings gains from community college attendance and completion (Belfield & Bailey, 2011), there is virtually no research that links how job market information, benefits, and costs are linked to students' decision-making processes. Furthermore, college leaders are not designing strategies and services or programs that aim to better align students' community college experiences with their desired careers and available jobs.

This article considers that, for community college students, job opportunities are not just about what comes *after* college completion, but they also fundamentally factor into students' decisions to persist toward degrees *during* their enrollment. With more than 80% of community college students nationally working either full- or part-time (Mullin, 2012), community college students' concurrent employment and their desired careers could be used strategically and purposefully as tools for increasing student engagement, retention, and success. Community colleges must better recognize and foster opportunities for what we term, *career capital*—accumulation of career knowledge and competencies and of information about potential jobs (D'Amico et al., 2012)—during students' college-going experiences.

Most, if not all, strategies provided by scholars to improve college completion rates revolve around the notion of *student engagement*. The belief that increased student engagement will enhance persistence and success is built on a theory of college student persistence (Tinto, 1975, 1993) that argues that students must integrate both socially and academically into college life to succeed. Yet, the nature of this engagement is confined to within-college relationships, within the institution in which they are enrolled. Consequently, the focus of many college success initiatives center on this model, thereby failing to consider essential sociological elements of students' decision-making process that are embedded in relationships and dynamics external to their institution of enrollment. Specifically, we consider (a) student perceptions of various opportunities and risks structured into the current labor market, and (b) student socio-academic exchanges with peers and faculty regarding career goals and strategies. That is, in their decisions to stay, transfer, or dropout, students constantly incorporate considerations related to the labor market they face: How difficult (or easy) is it to get a job in my field? How much economic value does my credential (degree or certificate) have? What are the costs of obtaining my credential? Do I have the skill set that the job I want to obtain requires? Which courses will prepare me better for the job I want to have in the future?

Therefore, the goal of this article is to draw on existing economic and sociological theories and to propose a complementary framework to study community college students' persistence. Our model builds on the following relevant notions: (a) human capital theory (Becker, 1976), (b) social integration (Tinto, 1975), and (c) socio-academic integration (Deil-Amen, 2011). Our model basically claims that a cost–benefit analysis should be *directly* considered when studying persistence. That is, instead

of following traditional models of persistence, which treat the cost–benefit analysis indirectly—as having an effect on students' goal commitments—we argue that there are advantages to treating student persistence as an economic decision embedded within a sociological context. Many of the elements in Tinto's model are included in this revised model. However, the emphasis is different, and hence the policy implications differ.

In the following, we briefly present the key foundational concepts of current models of persistence. Then, we discuss the missing link: How the structure of the labor market (and associated work–family–schooling considerations) affects students' perceptions of the economic value of their credential and their decision to persist. Next, we present and discuss our alternative conceptual model to study community college students' persistence. To exemplify and strengthen our claims, we use data from the National Center for Education Statistics and the Bureau of Labor Statistics (BLS) to illustrate the importance of explicitly considering the structure of the labor market in a student persistence model. We conclude our article with an elaboration of the implications for policy and practice.

Conceptual Foundations to Study Students' Persistence at Community Colleges Human Capital Theory

One of the most important theories in economics is the theory of investment in human capital—the abilities and skills of any individual, especially those acquired through investment in education and training, that enhance potential income earning (Becker, 1976). This theory has helped researchers, educators, and policy makers to better understand why students make investment decisions to improve their productivity. Concretely, human capital models examine how students make cost–benefit analyses and subsequent decisions on whether to attend and persist in college based on certain information, including tuition, fees, books and supplies, transportation costs, foregone earnings, and financial aid. Moreover, the theory of human capital suggests that students constantly evaluate the benefits (and costs) of further education in terms of the income increase that would result from their gains in investing in more education.

The human capital model has a considerable amount of explanatory power when considering monetary benefits and costs on students' college enrollment and persisting decisions (Paulsen, 2001; Perna, 2006). Indeed, there is robust evidence that associate's degrees and years of community college education yield extra earnings compared with high school graduation (Belfield & Bailey, 2011). There is also evidence that vocational certificates and basic credits contribute positively to successive earnings (Belfield & Bailey, 2012). But this model has not yet enumerated all the potential implications of community college students' decisions to attend and persist in college. Indeed, there is need to study the forces that shape both the demand for and the supply of resources for investment in human capital (Perna, 2006). One method, as Paulsen (2001) suggests, is to focus our attention on how students form perceptions of (the less tangible) benefits and costs of participating and, we add, persisting in higher education. These include, for example, the different ways in which students acquire and use

information about job markets they intend to participate in and the various college experiences that inform their choices about future careers and jobs. Another aspect to consider, as claimed by Grubb and Lazerson (2004), is that many students who attend community colleges do not make calculated or thought-through decisions due to the many obligations from work and family they negotiate on a daily basis. In other words, these students face several "work-family-schooling dilemmas" (Grubb & Lazerson, 2004, p. 99) that prevent them from completing schooling as they may like or anticipate, further complicating a simple cost–benefit analysis of their investment in postsecondary education.

Tinto's Model and the Centrality of Integration

Another method to examine students' decision-making process focuses on students' experiences with the institution. This perspective departs from the economic perspective and suggests that students may develop and enter a particular higher education institution with intentions about persistence that guide their behavior while attending college. Student persistence theory developed by Tinto (1975, 1993) suggests that students who are well-integrated into the academic and social realms of the college they attend are more likely to persist than students who are not. According to this model, students who are well-integrated academically but socially un-integrated in the college are likely to depart to another institution. Students who are poorly integrated into both systems are likely to drop out of college altogether. Implicit in this theory is that persistence rates may differ significantly from one institution to another and from one type of institution to another. To the extent that students at residential institutions have more opportunities for involvement and contact with their peers outside the classroom than students at commuter institutions, they are better integrated into the social life of their school; hence, they are more likely to persist.

Given the importance of academic and, especially, social integration in Tinto's model, this framework meets the needs of some institutions more readily than it does others. In particular, an application of Tinto's model to a residential 4-year institution has a greater impact than its application to a non-residential community college. This is not surprising, because Tinto's (1975, 1993) model and much of the available scholarship on college students' persistence have been developed with research from full-time, 4-year on-campus residential, predominantly White, 18- to 23-year-old students. Tinto's model works differently among community college students than it does among students at other institutions (Deil-Amen, 2011). Given the large proportion of non-residential 2-year colleges in educating the large number of non-traditional students who have entered higher education in the past several decades, there is a need for an alternative model of student persistence to fill in some of the gaps not addressed by Tinto's framework.

Several studies have indeed examined student persistence at the community colleges and other commuter institutions and found social integration to be less relevant (e.g., T. Bailey, Leinbach, & Jenkins, 2005; Braxton, Hirschy, & McClendon, 2004; Nora & Rendón, 1990; Pascarella, Smart, & Ethington, 1986). In particular, this body

of research suggests that instead of focusing on social engagement, community colleges should provide students with concrete services/programs that meet their academic needs. For example, Braxton et al. (2004) suggest the creation of learning communities to build student involvement in the classroom and for providing courses at convenient times and locations. Other factors that may be important for improving student persistence at community colleges are academic advising, applied pedagogies, and well-designed internships (T. R. Bailey & Alfonso, 2005). Consequently, the notion of "socio-academic integrative moments" (Deil-Amen, 2011) is of particular relevance for an alternative model of persistence because it considers the role of career and market-based discussions as a central element of student integration at community colleges. As Deil-Amen (2011) reveals, but does not elaborate, socio-academic exchanges are often about career goals, strategies, and program-related content. Routinely, these moments occur within and just beyond the classroom with instructors or between classmates and are likely to be directly related to job prospects, opportunities, relevance of credentials, and so on, especially in more applied programs. Furthermore, such exchanges may be just as likely to occur in places external to the college campus, such as at their current job, in their community, among friends and family members, and so on. These fused "socio-academic" interactions play a prominent role in 2-year students' sense of connection and motivation to persist (Deil-Amen, 2011). The concept of socio-academic integration remains relevant, but the job and labor market aspects of such crucial exchanges on- and off-campus should be further explored, particularly in terms of how they relate to persistence decisions.

The Missing Link: How the Labor Market Structure Influences Students' Decisions to Persist

Whether the focus is social integration or socio-academic integration, what these integration-focused approaches have overlooked is the dynamic influence of job markets for community college students. According to Tinto (1975), the job market does play a role in students' initial decision to attend college, but, it does *not* directly influence students' persistence. Instead, the structure of the job market acts indirectly through the concept of goal commitment. That is, according to Tinto (1975), academic and student integration determines students' enrollment behavior only to the extent that the job market is stable. If the market is in decline or unhealthy in other ways, students may decide to leave the institution based on a weakened certainty about the reliability of the expected economic returns to their degree, even if they are very well-integrated into the academic and social systems of the institution.

Job markets served by the community colleges may differ from those served by 4-year institutions in ways that Tinto did not anticipate, placing a smaller emphasis on the completion of an academic credential for community college students (Grubb, 1993, 1996, 2002). Part of the reason may be that pre-baccalaureate labor market is inherently more unstable (Kolesnikova, 2009; Van Noy, 2011), and in addition to family and work obligations (Grubb & Lazerson, 2004), students' on-campus socio-academic experiences may influence goal commitment in ways not delineated in

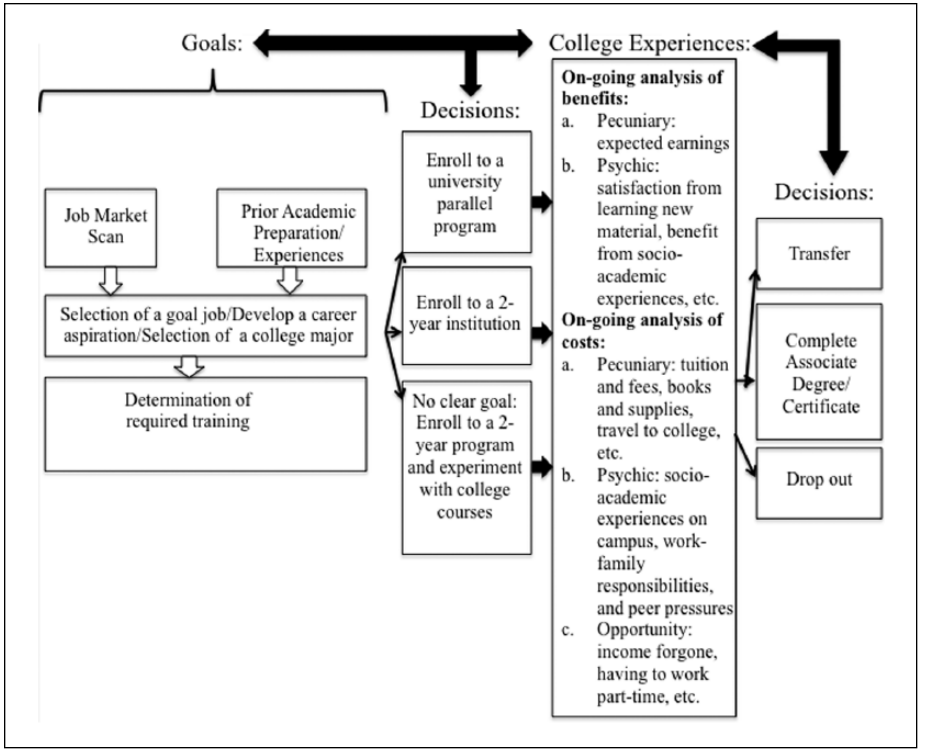

Figure 1. An alternative model of student persistence.

Tinto's framework. Students may engage in ongoing socio-academic interactions with their peers, instructors, and other college staff that shape their definition of labor market opportunities and influence their scan of the labor market environment. As a result, if students feel the job outlook in their chosen field is much less favorable than originally thought, they may decide to drop out—even if they are well-integrated, or perhaps even as a result of being well-integrated. In addition, it is plausible that students—through their interactions, relationships, information gathering, and conversations both on- and off-campus—may find that in some programs, employers place a lesser value on the credential they are seeking than originally thought. In such cases, students will have an incentive to quit their program of study (and perhaps leave higher education), even if they show relatively high levels of social or academic integration.

An Alternative Model of Persistence for Community College Students

According to our proposed alternative model (see Figure 1), students inform their decisions to persist or to complete, transfer, and dropout through a dynamic process in

which initial goals are modified as a result of students' experiences while attending college. Students enter the community college with a set of goals and expectations, which are based on their personal characteristics and previous academic experiences. Once enrolled in college, they alter their objectives depending on their socio-academic experiences (positive and negative) at the community college and on the various experiences arising off-campus in their family and work lives.

One possibility that has *not* been considered by researchers and practitioners is that students may adjust their goals in response to changing perceptions about the educational requirements of the jobs for which they are preparing. Students form their goal commitments through an ongoing process of cost–benefit analysis. If, for example, students find that their prospective job pays less than expected or requires less training, they may lower their educational goals from an associate's degree to some college courses or a certificate. Conversely, if students find that their prospective job pays better than expected or requires more training than anticipated, they may raise their educational goals and expectations. Another possibility is when students see that their prospective job requires more credentialing and a longer time investment than originally expected. In this particular situation, they may choose to give up, drop out, or delay their studies until adjusting to their current family circumstances and/or work responsibilities. Consequently, the incentives confronting students who enroll at the community colleges may greatly differ, depending on the major and degree they are pursuing.

Community college students, researchers, leaders, and practitioners may benefit from a model that assigns a more direct role to students' perceptions of the economic value of a credential. Several approaches could be taken to develop such a model. However, the most direct approach is simply to reformulate Tinto's model to (a) consider students' cost–benefit calculations on their decisions to persist and (b) treat the concept of socio-academic integration as *psychic costs and benefits* (McIntosh & Rouse, 2009) incurred by students as they engage in their studies. Using this approach, students treat the decision to enroll, and persist, in college similar to how they treat any other investment decision. They tally up the costs and benefits of completing an education and only enroll and persist if the anticipated benefits of completing a degree exceed the costs, subject to students' interests and perceived strengths and abilities.

In contrast to existing models that examine only tangible costs and benefits in students' decision-making processes (e.g., Gill & Leigh, 2003; Kane & Rouse, 1995), our alternative model considers costs and benefits in three general forms: pecuniary, psychic, and opportunity. Pecuniary costs are the actual monetary costs of completing a degree, including tuition and fees, books and supplies, and travel to and from class each day. Pecuniary benefits are the discounted lifetime earnings students expect to receive from completing a degree. Psychic costs and benefits include a range of intangible factors, such as the pleasure students receive from mastering a subject and the frustration by taking classes for which they are poorly prepared. Examples of these psychic costs and benefits include the following: "I hate math," "It's only a community college . . . ," and "I like the thought that people will respect me if I can get a responsible job." Finally, opportunity costs refer to the income students forego by

deciding to enroll in a semester of classes, or by being forced to work part-time (vs. full-time), or by having to factor in the trade-off of "living" off financial aid or not. However, opportunity costs may also take the form of psychic costs incurred by students who spend their time pursuing an education when they could be spending it in other ways that they might find more appealing. For example, "I'd rather be spending time with my friends" or "I hate to spend time away from my children."

Furthermore, in our model, students base their educational objectives, at least in part, on signals from job markets. Students scan the job market to find a career field they can enter to increase their lifetime earnings. They then scan the range of available educational programs to find one that will enable them to meet the requirements of the job. In searching for a program they can pursue to achieve these goals, students have a wide range of programs available at 2-year colleges, 4-year colleges, proprietary schools, or adult training programs of various types. To select the college program they will pursue, students compare the earnings they expect to make from the job with the cost of completing the required education. They then enter that program that yields them the greatest possible income at the lowest possible cost, subject to students' tastes and preferences.

Due to their open access missions and low tuition costs, many students will select community colleges. Once enrolled in community college, students will take classes up to the point the perceived cost of doing so exceeds the benefit. However, the community colleges offer a wide range of programs that prepare students for a wide range of jobs that require a certificate, associate's degree, or additional postsecondary education. To the extent that the opportunity cost of a semester of instruction exceeds the benefits students expect to receive by continuing in school, they will have an incentive to quit. As a result, a student's chances of actually completing an associate's degree will vary considerably from one program to another.

The Evidence: How Might the Structure of the Labor Market Affect Community College Students' Decision to Persist (or Not)?

According to Grubb (1993, 1996, 2002), the sub-baccalaureate job market follows a different dynamic than the baccalaureate market. Unlike the market for professional and managerial workers, employers place a lesser emphasis on formal education when hiring workers for jobs that require less than the bachelor's degree. Although employers may require the associate's degree when filling certain positions in the health careers (for example, nurses), they often prefer specific experience when filling positions in business, engineering, and the public services. Alternatively, they may accept an industry-standard, skill-based certificate, rather than an associate's degree. Many of these positions are with smaller firms; hence, the job ladders available to students who fill these positions may be fairly limited. Several studies (e.g., Belfield & Bailey, 2011; Grubb, 1996; Jacobson & Mokher, 2009; Kane & Rouse, 1995, 1999) indicate that students who take classes at the community colleges may earn significantly more than

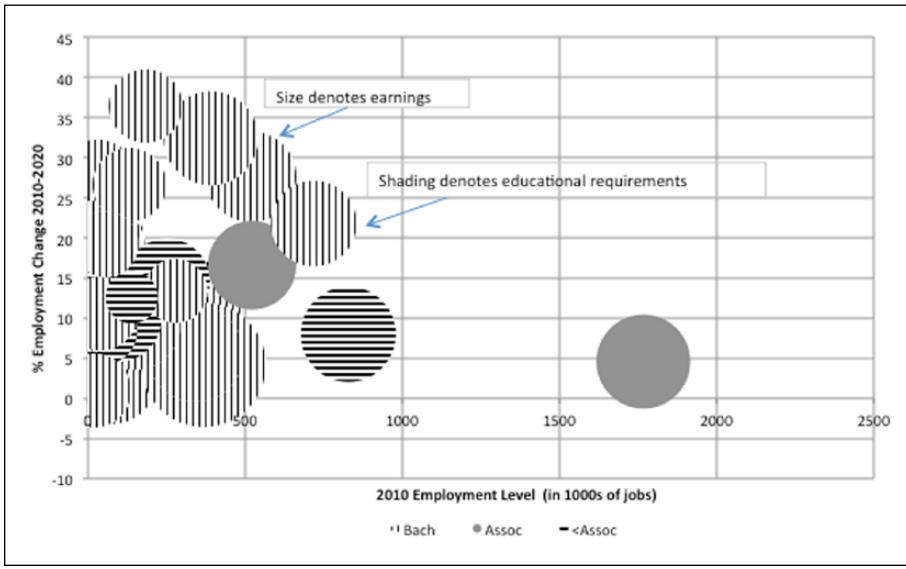

Figure 2. Job market attributes of occupations in "credentialing" business careers.

they would if they had terminated their educations at the high school level—even if they do not complete an associate's degree or certificate. However, other studies (see Grubb 1993, 1996, 2002) also indicate that the financial return to a sub-baccalaureate credit in one subject area may differ significantly from the return for a credit completed in another. Moreover, differences at the sub-baccalaureate level may be greater than they are at the baccalaureate level; hence, students who enroll in programs that culminate in an associate's degree may confront a different set of incentives than do students who are pursuing a major that leads to a bachelor's degree or higher.

One way to see the manner in which job market incentives may vary from one program to another is to create a graphical model depicting each job in terms of three or four job market attributes that distinguish it from other occupations. Figures 2 through 4 provide such a set of graphics for a group of career programs offered at a particular college in the Midwestern United States.

In these figures, academic programs are divided into three broad categories: credentialing business programs, non-credentialing business programs, and credentialing health technology programs. For purposes of this analysis, credentialing business programs were defined as those programs offered at a particular institution[1] which prepare students for jobs requiring an associate's degree or higher. Examples are accounting and business management. Non-credentialing business programs are those programs that prepare students for jobs requiring an associate's degree or lower. Examples of these programs are court and conference reporting, hospitality management, and marketing. Credentialing health careers are programs that prepare students for positions

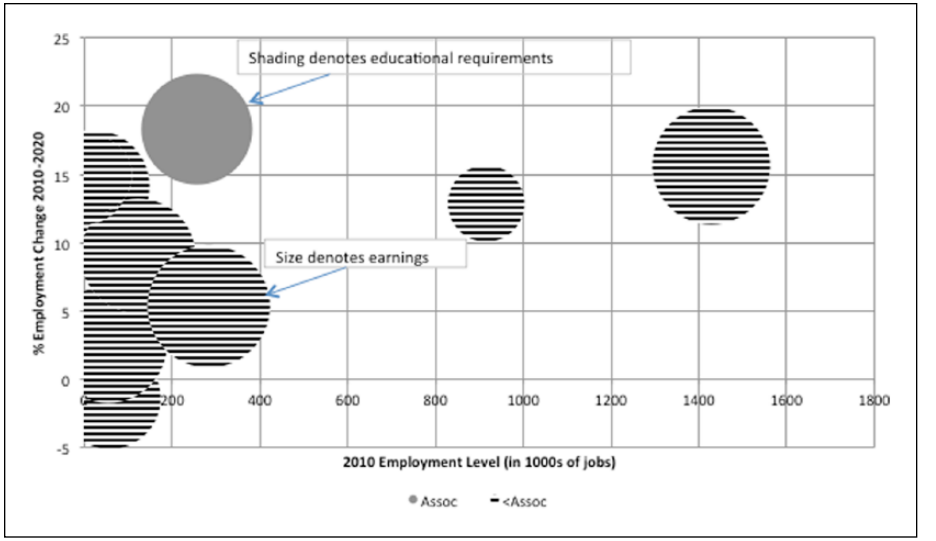

Figure 3. Job market attributes of occupations in the "non-credentialing" business careers.

that require them to pass a licensing examination or other certification. Examples of these programs are physical therapy assisting technology, nuclear medical technology, and respiratory therapy.

Charts in Figures 2 to 4 conceive of program-related job incentives on four dimensions: the number of people employed in an occupation in base year 2010; the employment change, expressed as a percent, over the period from 2010 to 2020; the median annual wage in the occupation in 2010; and the typical amount of education required to work in an occupation.[2] Data used in these tables are aggregate U.S. data, taken from tables prepared by the BLS. In these graphs, the number of workers employed in a given occupation is presented on the horizontal axis. Job growth (from 2010 through 2020) is displayed on the vertical axis. The median annual (2010) wage is depicted by the size of the bubble, and the shading of the bubble depicts the typical educational requirement. Using this latter coding, a job that requires a bachelor's degree is indicated by a bubble with vertical line shading, a job that typically requires an associate's degree is indicated by a bubble with solid shading, and a job that typically requires less than an associate's degree is represented by a bubble with horizontal shading. Thus, the ideal job for a student pursuing an associate of applied business degree would be a large bubble with solid shading, located in the upper right hand section of the chart. Such a job would be characterized by a large number of openings, rapid growth, and a high salary. The minimum educational requirement for such a position would be the associate's degree. The least favorable job would be a small bubble with horizontal line shading located in the lower left hand section of the chart. Such a job would be characterized by a small number of job openings each year, low growth, and low pay. Such a job would require less than an associate's degree.

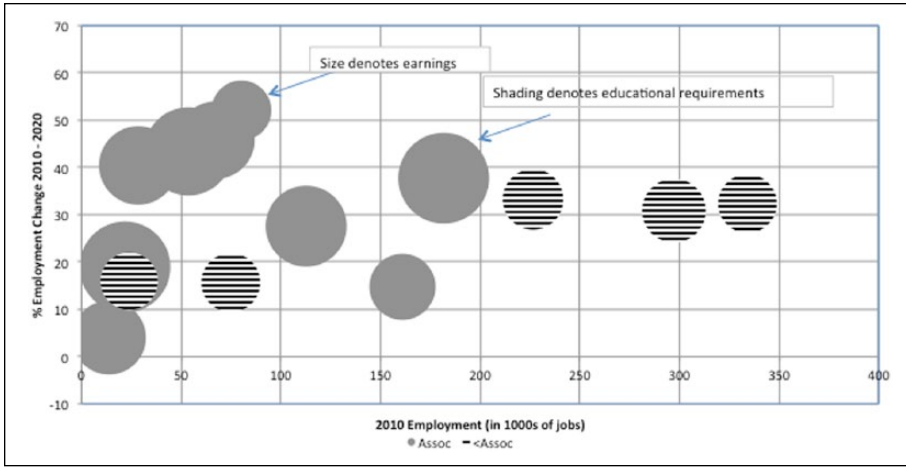

Figure 4. Job market attributes of occupations in "credentialing" health careers.

A closer examination of these figures suggests that the match between educational requirements of specific jobs and credentials offered by this community college varies considerably across these three program categories. Not surprisingly, the most favorable job markets for the completion of an associate's degree are in the health technologies. Not only do these occupations have a relatively large number of job openings in a given year, they also offer high salaries and steady growth. More importantly, they virtually all require an associate's degree, as evidenced by the solid shading. By contrast, a student who pursues a degree in the credentialing business technologies sees a much different occupational profile. Salaries in these occupations are high, openings are numerous, and job growth is strong. However, these jobs tend to require the bachelor's degree or higher. Business courses taken at the freshman and sophomore level do not necessarily transfer to 4-year colleges, which tend to require them in the junior and senior years; hence, students pursuing an associate of applied business degree in these areas have an incentive to quit these programs before they have finished an associate's degree. They may transfer to a 4-year institution, without completing their associate's degree. Contrastingly, students in the non-credentialing business technologies see another picture: smaller occupations, lower salaries, lower growth rates, and lower educational requirements. Such students may have an incentive to quit their degree programs without completing a credential if they find they can obtain the job they are seeking without completing an associate degree of applied business.

The point behind this brief analysis is as follows: Students pursuing different academic majors at a community college face radically different job market incentives. These incentive structures affect students' decisions to enroll, persist, and succeed. Two important issues emerge from this discussion. First, two different labor markets for community college students exist: (a) the baccalaureate market that places a great emphasis on credentials, and (b) the sub-baccalaureate market that values experience

more than credentials. Students need to be aware of these and, most importantly, need to be able to navigate both markets to make their decisions. Second, models of student persistence need to consider not only the potential benefits of the various labor markets but also the costs that community college students incur while attending class and attempting to complete their degrees.

Implications of the New Model for Policy and Practice

Drawing on the work of several theorists (Becker, 1976; Deil-Amen, 2011; Tinto, 1975) and on available labor market data, we provide a strong justification for the relevance of a proposed alternative model of student persistence at community colleges. Results of this analysis are consistent with both a human capital theory and a socio-academic integration approach. Findings, therefore, support an alternative model that incorporates elements of both approaches in a way that applies students' cost–benefit considerations of the value of their specific credential weighed against the pecuniary, psychic, and opportunity costs of attendance.

Given the importance that the structure of the labor market exerts on students' decisions, it is important for community colleges to design strategies to improve students' benefit/cost comparisons. Community colleges have developed a wide variety of programs to help reduce the cost of going to school by increasing the number of grants, loans, and work–study packages available to their students. Similarly, community colleges have tried to reduce the non-pecuniary costs by providing services to build students' confidence and success strategies (e.g., tutoring services, courses in college survival, and providing day care). Colleges have also developed some tools to increase students' knowledge of the perceived benefit of completing a degree. These tools involve services designed to inspire in students a wish to prepare for a higher level career than they might otherwise have considered. The primary tools available to policy makers consist of such services as career counseling, job fairs, and career exploration courses.

Based on our model, an effective student retention policy would involve the creation of some well-delivered package of cost reduction and benefit enhancing student services. The optimal combination of such services would also find concrete ways to increase students' college–career alignment—the connection between students' college experiences, career goals, and their employment opportunities. There are some tools, such as the College and Career Capital Survey (CCCS; D'Amico et al., 2012), that can help colleges to create a college–career alignment index. Collecting such information may help colleges understand how students obtain information about the job market and may help connect them with information about the structure of the labor market, with internship opportunities, and with specific services that can increase students' *career capital*—resources embedded in personal networks of family, classmates, and peers in work settings to inform educational and career pursuits (D'Amico et al., 2012).

Furthermore, colleges must expand their notion and measures of success. That is, instead of relying exclusively on completion rates, they need to acknowledge that

improved connection to college (integration) and pathways to jobs pre-degree are also valid measures of success. Community colleges should collect data on various dimensions of the proposed model, including measures of socio-academic integration (e.g., how connected students feel to their peers and college, frequency of interaction between students and faculty, and access to various sources of social capital), measures of progress toward degree (e.g., credits attempted vs. credits completed), and measures of success (e.g., employment rate, employment retention rate, job satisfaction, average earnings, attainment of credits toward degree(s), attainment of industry-recognized certificates [less than 1 year], and attainment of industry-recognized certificates [more than 1 year]).

Finally, there is need to conduct more research that connects community college students' perceptions of costs and benefits of obtaining their degree with various broader measures of engagement and success as few examples exist on this particular type of research (i.e., Stuart, 2009). Also, there is a great need to enhance a dialogue between community college leaders and employers related to students' career pathways. Employers can (and should) help institutions select the occupational areas included in conversations with students around career pathways to ensure that students are being prepared for economically viable jobs (Hughes & Karp, 2006). In addition, employers can advise faculty and program administrators on issues of curriculum and provide students with work-based learning and job-shadowing experiences to enhance their classroom learning (Hughes & Karp, 2006).

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Notes

1. This community college is a multi-campus college located in the Midwestern United States and serves more than 52,000 credit and non-credit students annually (39% of their students are racial/ethnic minority students).
2. The following procedure was used to obtain data used in these charts:a. Every educational program offered in the United States can be assigned to a 6-digit CIP (Classification of Instructional Program) code. The student information system of the college under study in this article contains CIP codes for all programs offered at this institution. As a first step in this analysis, CIP codes for higher enrollment programs in the business and health careers were extracted.b. Using a crosswalk developed jointly by the National Center for Education Statistics (NCES) and the Bureau of Labor Statistics (BLS), occupations associated with each CIP code (hence, educational program) were identified. This crosswalk can be accessed at http://www.nvcc.edu/about-nova/directories–offices/administrative-offices/oir/bulletins/docs/2311ciptosoccrosswalk10.pdf. Depending on the educational

program under consideration, a given major might be associated with one occupation or several occupations.c. Using the Standard Occupational Code associated with each job title, national forecast data were then obtained. These data are available at http://www.bls.gov/emp/ep_table_107.htm. Table 1.7 in the spreadsheet version of this data set contained all four of the variables used in this article. Of particular importance, "typical education needed" was coded using a taxonomy consisting of eight categories, from "doctoral or professional degree" down to "less than high school." For purposes of this article, these categories were combined to form three groupings: (a) bachelor's degree and above, (b) associate's degree, (c) "postsecondary non-degree award," and below. A discussion of the measures of education and training used by the BLS can be found at http://www.bls.gov/emp/ep_education_tech.htm

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