Matching All Students to Postsecondary Opportunities

How College Choice is Influenced by Institutional, State, and Federal Policy

**Matching Talents to Careers:
From Self-Directed to Guided Pathways**

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College plays an important role in connecting students with jobs and careers. Individuals with college degrees are on average able to secure higher paying, higher status jobs than are those with no college credential or even some college. Students do bring to college innate aptitudes, tastes, and temperaments that may make them better suited to certain careers than to others. Yet, the experience of college is intended to help them not only build on their talents in ways that will enable them to advance in the labor market, but also explore career options and develop interests that will help them determine what occupations they want to work in.

This chapter examines the matching process between students and college programs or majors. The discussion of matching has so far focused primarily on the matching between individuals and institutions, but students' experiences in college and their college outcomes can vary profoundly depending on the major or program that they choose. The research is clear that the choice of major has a great bearing not only on how much students will earn, but on what types of jobs they will secure.[1] So student access to future employment is fundamentally associated with the process of major selection. Choosing the right major—and completing the requirements for that major—is therefore a critical element of a good match.

In this paper, we focus primarily on community colleges. Even if efforts are made to ameliorate the problem of "undermatching" discussed in other chapters in this volume, the role of community colleges and broad-access four-year institutions in helping students connect to employment would still be important. One reason is that there are simply not enough slots in selective institutions to meet the demand for higher education in the United States—even among students who would be qualified for admission to such

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institutions. Community colleges enroll nearly 45 percent of undergraduates; broad-access four-year institutions enroll more than 15 percent. Together these institutions enroll the majority of undergraduates who are low-income students or students of color. And while some of these students are well-qualified for college, large shares of new students in both types of institutions—and the majority of students in community colleges—arrive poorly prepared for college and therefore would be unlikely to qualify for direct admission into more selective institutions. Regardless of their academic readiness, lower income students in particular are constrained in their choice of college, tending to be much more likely than higher income students to choose college based on price and proximity to their homes.[2] So for millions of students, broad-access institutions are their only option for college.

We maintain that major selection or matching is ideally seen as a dynamic learning process. The concept of "match" or the matching model as it has been used in the college undermatching discussion has focused attention on the correspondence (or lack thereof) between fixed student characteristics (such as SAT scores) and fixed college characteristics (admissions selectivity). This emerging literature on undermatching emphasizes the importance of providing information to students in order to bring their characteristics and college characteristics into alignment. The corresponding perspective for the student/major/career match would be to provide information on careers and programs—program requirements, completion rates, job placement outcomes, earnings, and so forth—so that students can find programs that correspond to their personal interests, goals, and aptitudes. Our main argument in this chapter is that this informational approach is too limited to be the basis of an effective system to help

students match to a suitable academic program and career. Rather, we believe—based on research on the major selection process—that while information is important, efforts to improve program choice need to provide students with an opportunity to learn about themselves and their options, and that college programs and support services need to be organized to promote such learning. We also argue that that will require the rethinking and redesign of the majors themselves. Thus, to improve students' major selection decisions, college educators and policy makers need to explore how to make the major selection process a rich learning experience for students and—in the case of community colleges and other broad-access institutions—how to do so with the limited resources available.

Currently, the major and career selection process at community colleges—and we believe broad-access four-year institutions—is typically haphazard, leaving students to find their way mostly on their own. Community college students typically arrive without clear goals for majors and careers and with limited awareness of their options. They are confronted with an often bewildering array of programs to choose from. And yet colleges provide very limited advising and other supports to help them make those decisions. This is particularly problematic for students in community colleges who, compared with students in selective colleges, tend to have less support for making college and career decisions from their families and other networks outside of school. And the colleges often do not keep close track of students' major decisions. As Bailey, Jenkins, and Leinbach have observed, it is often difficult to determine community college students' majors, in some cases because students themselves are unsure.[3] If students are unclear about their major—or decide on one late in the process—they may take courses that do not count

toward their degree. Thus the problem is not only one of finding programs that are appropriate for students, but more generally to help them find an appropriate program early in their college experience before they waste time and resources and become discouraged.

Within this context, the major selection process is far from a rational calculation of costs and benefits of different choices or options. Moreover, the chaotic, confusing, and often delayed process of program selection is itself a barrier to successful college completion.[4] Given the importance of major selection for students' career outcomes, and the limited resources for making such decisions that community college students generally have from their families and other outside networks, the lack of a well-supported process for major selection in community colleges is a potentially strong impediment to long-term success and upward mobility for students at these institutions.

This chapter is an effort to broaden the discussion of match to include major selection in community colleges and broad-access four-year institutions. In the process we seek to move from a static model of matching students with fixed characteristics to the "right" college and major to one that sees matching as a more dynamic learning process and one that recognizes that this may require that the structure and organization of the colleges and the major programs they offer may have to change as well. The chapter is organized as follows: First we discuss the importance of major selection to student outcomes, particularly employment. Then we examine the undermatching controversy to highlight how that discussion relates to our argument about major choice. Next, we review research on the determinants of major selection and discuss the process of major selection, reporting on how that takes place in community colleges and broad-

access four-year institutions. Finally we describe what some colleges are doing to improve the major selection process, and end with a conclusion that relates our arguments to the broader matching discussion.

THE IMPORTANCE OF MAJOR SELECTION

Across higher education, there are big differences in earnings by college major.[5] At the baccalaureate level, earnings advantages are substantial for technical subjects with significant math content (such as engineering or economics). The gap between high-pay and low-pay majors appears to be very large. Annually, earnings of high-pay majors are 13 percent higher than those of low-pay majors.[6] Over a working lifetime, the earnings of STEM graduates can exceed those of arts/humanities graduates by $800,000.[7] However, many liberal arts degree holders progress on to graduate school in professional subjects (such as law or medicine). For this subgroup it is difficult to attribute earnings gains to their undergraduate college major, although in many cases their undergraduate majors give them better access to graduate degrees associated with higher earnings.

Similarly, substantial earnings gaps by major are evident among graduates of community colleges.[8] For graduates with associate degrees, the labor market returns are higher in vocational and technical subjects compared to arts and humanities. At the same time, community college arts and humanities degrees are designed for students intending to transfer; the earnings of students with such degrees who do not transfer are misleading. Returns are especially high for graduates in nursing programs and health fields.[9] For

diploma and certificate award holders, the pattern across subjects is mixed, in part because returns to these awards are smaller and may be short-term.[10]

But the potential earnings associated with a major are also determined by the chances that the student will get a job that requires the skills taught in that major. Thus, the characteristics of each college major should not be considered in isolation from the occupational choices graduates make.[11] That is, when making major choices, students should be aware that the earnings gaps depend on what was studied together with the type of jobs the graduates wound up getting. John Robst estimated an earnings penalty of 10-12 percent if a graduate has a job that is "somewhat" or "not" related to their field of study.[12] Madeleine Gelblum found very large earnings premia for working in an occupation that corresponds to the college major.[13]

The importance of major choice goes beyond the appropriateness of the major or career for a particular student. Colleges, particularly community colleges, are complex institutions. Community college students, who are often first-generation college students, frequently enroll with little idea about how to navigate this complexity. They must make many choices about courses, programs, and transfer destinations with very little guidance. If they have no goal other than "going to college," then they have no basis for making those decisions. Many students flounder, taking courses that do not count for their eventual program choice (earning "excess credits"), becoming discouraged and dropping out.[14] Students who know what they want and have chosen a program are easier to advise and have a stronger basis for making decisions. And students with clear goals may be more motivated because they have a clearer understanding about how the material they are studying relates to their longer term objectives. Evidence thus suggests that students

who concentrate in a particular substantive area early on in their college careers are more likely to complete programs.[15]

UNDERMATCHING AND THE CHARACTERISTICS OF STUDENTS AND COLLEGES

The matching discussion has been prompted by the observation that many high performing, low-income students do not attend colleges as selective as those to which they could gain admission.[16] This reduces their long run-opportunities, because, according to this argument, students at more selective colleges tend to have better educational and employment outcomes.[17]

The matching literature basically envisions a set of characteristics—in the undermatching case, a combination of student grades and SAT scores (for simplicity we just refer to this as their SAT score). Those characteristics also correspond to colleges—for example average SAT scores or level of selectivity.

Much of the argument has focused on the equity issue in those cases when high achieving low-income students end up in colleges with lower SAT averages, when they could gain admission to more highly selective colleges. This reduces their opportunities because these colleges have higher completion rates and in many cases would provide full financial aid. But, as we have argued, better matching in this sense can improve the opportunities of only a relatively small number of low-income students; there are a very limited number of enrollment slots in such selective colleges.

Can the strategy implied by the matching model help a much wider range of students? The logic of the model suggests that, ideally, students should go to a college where the average SAT score is higher than their own score. But, except in some version of Lake Wobegon, everyone cannot attend a college where the average SAT score is higher than theirs. Thus if we assume that the average SAT score is related to college quality and that students should avoid colleges that have an average SAT score below their own, then the undermatching discussion leads to the conclusion that everyone should attend colleges where the average SAT score is more or less equal to theirs.

If the notion of "college quality" assumes that student outcomes are in effect "caused" by the college, and if college quality is closely related to a college's average SAT score, then in a perfectly matched system, college would be an institution that amplifies initial differences in academic achievement. Think of it this way: students who attend high-SAT colleges would by definition have high scores themselves, and they would get access to a higher quality, or at least better resourced, education than their lower scoring peers. Better matching through enhanced information will help some low-income students who do not have easy access to information to consider more selective colleges. But this process may in fact widen initial differences. The fact that low-income students do not have access to K-12 education that prepares them for more selective colleges is a much larger problem than the problem that some low-income students are prepared for such colleges but do not realize that they are.

This reveals the limitations of focusing primarily on information as a means to match students and colleges based on characteristics that are assumed to be fixed. Matching does not help most low-income students because they are not "high

performing." To reduce achievement gaps and improve opportunities for most low-income students, educators must change the "characteristics" of students by improving their preparation for college. They must also improve the performance of the institutions, such as community colleges, where most of those students enroll, so that not only "high performing" students will have access to high-quality institutions. If getting a good college education requires gaining admission to a selective college, the majority of low-income students will be left out. Focusing primarily on providing information to improve the academic match between students and colleges may well direct attention away from the need for these broader changes. Similarly, we argue that facilitating a better "match" between students and programs or majors will require broader changes in the major programs themselves.

In order to optimize major selection, and thereby improve student outcomes, we must understand the process through which students choose majors so that we can provide students with the information, tools, and experiences necessary to navigate the matching process. In the following sections, we review what existing literature has uncovered about major selection. First we look at the literature on the determinants of major choice. However, the majority of this research focuses on matching of fixed characteristics and thus fails to provide insight into how to improve the dynamic process of major selection. Therefore, we also look at emerging research on the major selection process to infer how students experience the match process and better understand how the process could be enhanced.

WHAT DO WE KNOW ABOUT THE DETERMINANTS OF MAJOR SELECTION?

Despite the importance of choice of major, there has been little research detailing how students choose. The research is almost exclusively descriptive, based on student choices of major and the association with fixed characteristics rather than on the underlying dynamic process that might make it possible to predict choice. What research has been done has focused mainly on major decisions in four-year institutions—and often selective universities—rather than on community colleges or broad-access four-year institutions.

Student Characteristics

Much of the literature examines simple relationships between demographic factors and personal characteristics and major choice. For example, many studies have found differences between women and men in preferences toward occupational roles and major field of study.[18]

　　While challenging methodologically, research on the impact of ability on college major choice has overwhelmingly found that ability is important in explaining sorting across majors. Researchers have provided evidence to suggest that sorting across academic disciplines reflects general ability, and that the probability of specific major take-up increases with major-specific ability as reveled by prior achievements in that subject area.[19] For example, students of higher levels of mathematical achievement (as measured, for example, using high school math grades and math SAT scores) are more likely to choose scientific and technical majors.[20]

Particularly relevant to concerns about equity, some research has shown that family background has a strong influence on a student's major choice, though only a few studies have examined this question. Maple and Stage found that parents of higher occupational prestige can influence students to choose more quantitative majors.[21] Leppel, Williams, and Waldauer found that men from high socioeconomic status families were more likely to major in business, and women from the same families were less likely to do so.[22] Further, while the status of a father's occupation had a larger impact on a female student's choice of college major than did her mother's, the opposite held true for males. In an analysis of program enrollment patterns of two-year college students in Washington State, Jenkins and Weiss found that low-SES students were overrepresented in fields such as education and childcare, which have low completion rates and relatively low labor market returns.[23] However, they were also well represented compared with high-SES students in nursing and allied health, which tend to have high completion rates and higher labor market returns for graduates.

Still other studies have examined the connection between major selection and personal preferences or tastes. For example, using an experimental design and students from New York University, Wiswall and Zafar found that while both perceived ability and expected earnings were significant determinants of college major choice, the most dominant factor was what they defined as "tastes."[24] The importance of tastes in academic sorting across disciplines suggests that students are concerned with finding the right "match" or environment in which they expect to most likely find enjoyment or fulfillment.[25]

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Major Characteristics

The characteristics of majors also ought to influence student choices. Much of the analysis of major choice has focused on the economic returns to particular majors, which we reviewed earlier. Knowledge about potential earnings has been shown to shape student choices. Beyond research on the effects of demographic factors, several studies have examined the impact of expected returns—both pecuniary and non-pecuniary—on major choice. For example, using data from second-year college students from the class of 2006 at Northwestern University, Zafar found that expectations of future earnings accounted for up to 55 percent of the choice of major, although job satisfaction was also an important consideration.[26]

The economic benefit of a given major reflects the cost that the student must pay to acquire that major. Slater used student-level data from three large public universities to determine the effects of tuition and financial aid on the choice of first-year college major. The author found that a higher net cost of college participation was associated with an increased probability of choosing majors offering higher expected wages (such as professional majors) and decreased probabilities of choosing majors with lower expected wages (such as humanities majors) and majors with more technical complexity (such as science majors).[27] Stange found that differential tuition schedules do in fact alter the distribution of students across majors. Further, he found that already marginalized students in certain fields, such as women in engineering, are particularly sensitive to new pricing policies.[28]

Dynamics of the Major Selection Process

Identifying the factors associated with major selection does not necessarily tell us that the choice was optimal or that it maximized the student's utility over the choices that he or she had. Nor does it tell us much about the matching process itself. But we can infer things about that process from observing student behavior. An emerging literature supports that idea that major selection is the end result of a dynamic learning process. For example, Stinebrickner and Stinebrickner found that while, on average, students come to college equally willing to take up a major in math or science as compared to a major in any other field, math and science self-efficacy affects major preferences as students see how well they do in these subjects. As a result, students with lower than expected grades move away from math and science as their final major selection.[29] Arcidiacono found that college grades provide students with new information that can affect final major choice: those who perform worse than expected are more likely to drop out or switch majors, while those who perform better are more likely to persist with their initial major choice.[30] Some studies find that students who delay their choice of major are more likely to persist and take less time to graduate, presumably because these students are better able to make a decision after having more time to explore and learn about the available alternatives.[31]

What is noteworthy about these examples is that they rely primarily on students' making these choices based on experience and grades, but without much guidance and with ad hoc information. The undermatching discussion has generated a simple and easy way to take measure of student-college match—by using the correspondence between SAT score (and other student characteristics) and the academic admissions standards of the college. We do not have a similar measure of the student-major match. But we can

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observe college policies and practices and the services and information they make available to students who are making these decisions. The next section examines the sorts of major decision-making supports typically provided to students in community colleges.

THE REALITY OF MAJOR SELECTION IN BROAD-ACCESS INSTITUTIONS

Most students, especially those recently out of high school, enroll in community colleges and other broad-access institutions without clear goals for college and careers.[32] Low-income students in particular are unlikely to have a clear idea of what opportunities are available to them.[33] This lack of clear goals could reflect either a lack of self-awareness on the part of the student or a poor understanding of the characteristics of majors and associated careers. What do colleges do to help students sort out these choices?

The most common source of information at community colleges is the school's website. Students can find a list of programs and program requirements online. In the past, web-based information has not been easy to use. A study of student usage of web-based information at a college in Michigan found that although information about program requirements was available, often students were not able to find it or understand it. And there was no consistency in the format across programs, making it very difficult to compare programs. Information on transfer requirements for different target colleges was particularly difficult to understand.[34]

This type of information can be more effective when combined with systematic advising, and indeed, the advising system is the most important service provided to students to help them choose programs and majors.[35] But community colleges in

particular devote few resources to this function.[36] Community college counseling and

advising centers often have few counselors compared to the number of students, with

ratios sometimes as high as 1,500 students for every counselor.[37]

The advising process should provide an opportunity for staff to help students

understand their strengths and weaknesses, to develop academic and associated career

goals, and to learn about what majors might correspond to those characteristics. But the

meager resources devoted to counseling do not create sufficient time to go through this

developmental process with students. A 2009 survey of entering community college

students found that while most were able to meet with an advisor who assisted them to set

their first-term schedules, almost a third said they were not helped to set goals or create a

plan for achieving them.[38]

Rather than helping students form goals, advising is focused on providing

students with information. But even here, information is often fragmented and not

presented in a way that helps students with decisions.[39] Students report lacking clear

guidance for where to go to receive answers to their questions.[40]

Most advising in community colleges focuses narrowly on academic planning—

counseling related to careers is provided separately and usually on a sporadic and

voluntary basis. Shaffer and Zalewski note that academic advising in the absence of

career advising "builds a bridge to nowhere."[41] Students often do not understand how to

relate their academic goals to the realities of the labor market.[42] Academic advisors may

refer students who are undecided about their field of study to the career office, but there

is often no follow-up to see if students did indeed take advantage of career services.[43]

Studies of career and self-assessment inventories indicate that these tools can help put students on a path toward identifying appropriate majors and careers for their interests and strengths.[44] But their use is generally independent of formal academic planning and course scheduling. Similarly descriptive studies have suggested that online tools such as Valencia College's LifeMap and the Virginia Education Wizard might be helpful to students in exploring options for careers.[45] Yet these "e-advising" tools and career inventories are less effective if used outside formal advising structures since students do not necessarily know how to use the knowledge gained from these sources to inform their academic plans.[46]

Many community colleges offer "college success" courses for new students, and these are another opportunity for students to explore their own characteristics, set goals, and learn about their options. Importantly, such courses often include an introduction to different degree programs and guidance on how to explore options for college and careers. But most college success courses cover a large number of topics, and some topics are not covered in much depth. A study of college success courses at three community colleges found that the career exploration component was covered in a perfunctory way.[47] So far, there are no studies linking participation in such courses to choice of or entry into program of study.[48]

The quality of career and academic advising does vary by field of study. In career fields, there is a tradition of faculty advising students in their programs, educating them about careers in their fields, and even helping them with internship and job placement.[49] And the curriculum paths through community college career-technical programs are often well structured with relatively clear connections to jobs.[50]

In contrast, students who are seeking to transfer or who are undecided about a major are often steered by default to a "general education" track, which consists of an often bewilderingly long list of liberal arts and sciences courses that they must choose from to fulfill distribution requirements.[51] Community college students often do not understand the value or utility of their general education courses, which tend to be broad surveys of a field.[52] Taking these courses may do little to help students clarify their interests and explore options for college and careers.

In short, community colleges have not created advising processes that take students through a systematic process of goal formation and academic planning, in part because they lack the resources to do so. They provide information in a superficial manner. Students are expected to learn about their preferences by being "exposed" to the courses and majors that are available at a college. While additional services are available to those who seek them out, many students end up self-advising. The students most often in need of supplemental advising and support—first-generation college students and others who are poorly prepared for college—are often the least likely to be aware that specialized services are available.[53]

Thus, community colleges can do a much better job of providing information about career and major options to students, but the problems go deeper than a lack of information. As we have argued, the process of choosing a major should ideally be a dynamic experience of exploration and learning goal formation. And yet, community colleges provide an often overwhelmingly large set of choices about programs, many of which are poorly defined and not clearly aligned with student end goals.[54] This problem is particularly acute in associate of arts programs intended to prepare students to transfer

to four-year institutions. Students who want to obtain a bachelor's degree but do not have a clear program goal are typically defaulted into "general education" coursework, where they can choose from a large array of courses within broad subject-area distribution requirements. While such courses may be accepted for "elective" credit by four-year institutions, they may not be accepted toward junior standing in a particular major, as major requirements are often set by individual departments within transfer destination institutions. Thus, once having transferred, students may have to take additional courses to satisfy bachelor's program requirements. Recent research indicates that the biggest barrier to community college students earning bachelor's degrees is the inefficiency of the transfer process.[55] In this context, providing more information about overly complex and poorly organized programs might help, but reorganizing the programs to make them more coherent and easier to understand may be just as or even more important than better advising. In the next section, we examine colleges that have undertaken program redesigns along these lines.

STRENGTHENING SUPPORT FOR MAJOR CHOICE

How might broad-access colleges improve this process? Enterprising institutions have taken on this question and have helped identify promising strategies.

Some colleges are making significant improvements in the quality, organization, and usefulness of web-based information. For example, City Colleges of Chicago has developed an easy-to-use website that categorizes all programs into ten academic/career focus areas. For each of those areas, there is an area home page where a student can find

a brief description of the area, sample career options, the specific City College program offerings in the area, recommended transfer options, and sample courses. The student can pursue much more detail including additional career options and degree and program requirements within the broad area, as well as earnings ranges. For more detailed jobs within a broad area, a student can find a semester-by-semester course schedule. Other colleges and universities, such as Arizona State University (ASU), have developed similar informational resources.

These represent significant improvements over the types of program information traditionally available online, and therefore provide a better foundation for improved matches between students and programs. Nevertheless, we emphasize two aspects of the development and use of this information that move it well beyond the simple provision of information so as to match fixed student characteristics to fixed program characteristics.

First, in order to develop these easy-to-understand program guides, City Colleges of Chicago reorganized its college-level programs by working with employers and four-year institutional partners to review and revise all programs to ensure alignment with the requirements for employment and further education. It created program maps with semester-by-semester course sequences, critical program courses, and other milestones students need to achieve to show progress in each program. Rather than only providing information to help students navigate their programs, City Colleges made that process less confusing and easier to understand, thus putting less burden on the advising process.

Second, another issue with the matching model is that it assumes students are aware of their underlying characteristics that they should aim to match. But, most students do not know what those are, and as discussed in the literature review, this

requires a learning process. Just providing students with information about careers and programs—even clearer, more useful information now becoming available—is not sufficient. Instead, students ideally need to have opportunities to actively explore options for majors and careers in advising and in the classroom. Students also need to interact with faculty, more advanced students, and others who can help to inspire and guide them. Given the limited resources most community colleges have for advising and career services, if colleges hope to give all of their degree-seeking students an opportunity to explore college and careers, they are going to have to take a different approach than they have in the past.

Recognizing the importance of providing opportunities for integrated career exploration and planning from the time a student enters college, a growing number of two- and four-year institutions are redesigning their programs and support services in ways that provide career exploration and planning assistance to all students who need it, not just the few who seek it out. These institutions are adopting a variety of strategies to accomplish this with the limited resources available. Ideally they are taking a multi-pronged approach that spans the student experience and starts as soon as students enter college. Some of the most promising ideas are described below. Notably, four-year institutions may be further along than community colleges in implementing these practices at scale.

Default program maps

Traditionally, students face a complex set of choices surrounding programs and a large number of course options within programs. Even when students have an idea about what

kind of career they might want to pursue, it is difficult to find a corresponding program when those programs are confusing and not well organized. To simplify options and ease decision making, some institutions have engaged faculty and advisors in developing academic maps that stipulate the courses students should take in a program and the sequence in which they should take them. These maps also indicate key milestones that students should achieve in order to stay on track to completing a degree or certificate in a timely manner. These kinds of maps are often the basis for improved websites like that developed by City Colleges of Chicago.

Maps become the default basis for students' academic plans. Students can modify their plans, but to do so they need to see an advisor. Clearly mapping out programs and making them the default reduces the chances that students will choose courses that do not help them advance toward their goal. As in the City Colleges of Chicago case, ideally, the maps are part of program descriptions that include detailed information about the specific career opportunities and further education programs students can pursue when they finish the program. Students exploring career and college options can use this information to see a map of the educational path they would have to follow to prepare for a career in a field of interest.

To help students choose from among the more than 300 majors it offers, in 2006 Arizona State University (ASU) began asking faculty members to map out the path to a degree in each program. These maps identify the courses that are most important to the major and indicate which one of a group of "critical courses" should be taken early in a student's program, since completing them has been found to predict success in the major. The maps serve as a default course-taking plan for students. In addition to the course

sequences, the maps also list milestones that students are expected to achieve, such as completing college math by a particular semester, if they are to stay on track. ASU officials say that the program maps are continually updated and reflect the interdisciplinary work that the university has emphasized in recent years.

Exploratory majors

Program redesign can also facilitate productive career and program exploration**.** New ASU students who are undecided about a specific major are now required to enter an "exploratory major" in one of the five most popular program areas: social and behavioral sciences, arts and humanities, STEM, business, and health and life sciences..

Students in exploratory majors at ASU are required to enroll in a sequence of one-credit major and career exploration courses, which are designed to lead students through the process of choosing a specific major. According to ASU Vice Provost Maria Hesse, these courses were developed by counseling psychologists to provide "a clear plan for what students need to do each semester to move closer to deciding who they want to be and what they want to become."[56] From a behavioral economics standpoint, exploratory majors use "active choice" to help students navigate to a major, requiring them to choose an initial broad program area and default curricula within each stream. Scaffolding students' decisions in this way makes it easier for students to choose from what may otherwise be an overwhelming number of choices (over 300 programs in all). Hesse said identifying students as "exploratory" also allows advisors to target information and other supports that help them choose a major.

Similarly, new students at Queensborough Community College (QCC), which is part of the City University of New York, are required to choose one of five "freshman academies" based on their interests and goals. QCC currently offers five academies clustered around related majors and programs: business, visual and performing arts, STEM, health-related science, and liberal arts. Students are required to choose an academy before they enroll. This is based on the contention that while many new students may not be able to choose a specific major, most are able to choose a broad field that they have an interest in. This creates a bridge between unfocused and almost random course taking that characterizes the current experience of many students, and the much more focused pursuit of a specific major. According to a dean and former faculty member who oversaw the Queensborough academies: "The idea is that students begin to see themselves as students in a particular field, pretty much from the start." According to the researcher who oversees evaluation of the academies, "Students say that being in an academy gives them a sense of identity as a student…. It causes them to reflect on what they want to do and what it will take to move ahead in the field."[57] Each academy has at least one faculty coordinator responsible for working with other faculty and student affairs staff to improve practice and build an academic community of students and faculty with similar interests.

As at ASU, students at QCC can change academies if the experience within an academy leads them to change their minds about what they want to study and do. Indeed, approximately 20 percent of students switch academies in the first year. In other words, the process of deciding on a major continues for many students long after they enroll. As

it is in every college, students change their minds about majors, but at ASU and QCC

there is an established process and clear guidelines to help students do so.

Building career exploration into the curriculum

In fall 2012, the City University of New York (CUNY) opened a new two-year college in

Manhattan, Guttman Community College. Guttman embeds career exploration into the

required curriculum. The college's design team was challenged to create a model that

would substantially improve student graduation rates, particularly among populations

traditionally underserved in higher education. To do this, the team rethought virtually

every aspect of the traditional community college experience, from the structure of

coursework, to the delivery of developmental education, to the mechanisms for

supporting students academically and in their lives outside of school. All students take a

common core curriculum embedded within a learning community; courses include a

"City Seminar" and an "Ethnography of Work" course, which allow students to connect

to issues that affect their urban community and explore their own career interests. One

purpose of the common first-year curriculum is to guide students through the process of

choosing an appropriate program of study. The first year curriculum includes exposure to

workplaces in related fields, and visits to bachelor's programs at four-year CUNY

colleges.[58]

Embedded advisors

Colleges may also embed advisors into particular program areas. This has a number of

advantages. For one, it means that advisors only have to become well-versed in

information about careers and further education in their specific field. Also, it means that the advisors can work much more closely with faculty. At Santa Fe College in Florida—the winner of the 2015 Aspen Institute Community College Excellence Award—students are required to choose a program area from the start.[59] Advisors are assigned to particular program areas and asked to manage a caseload of students in their program area, working closely with faculty from that program to help students stay on track. Santa Fe program advisors say that the ratio of students to advisors is around 400 to one, which they say is manageable. And they only have to keep up with transfer program and employer requirements in their assigned fields, not in all of the many programs offered by the college. Moreover, advisors report that they are able to work more closely with academic departments and faculty in their area than when advising was organized centrally at the college.

Tapping faculty expertise and contacts

Given the high ratio of students to advisors at most community colleges and broad-access four-year colleges, and given the importance of personal relationships in becoming engaged in college life and finding jobs, involving the faculty as central actors in college and career advising will be critical to the success of any effort. At Miami Dade College, academic advising is a not a formal faculty role as specified in the union contract. However, as part of their allotted time for service, Miami Dade faculty can agree to serve as student mentors. More than 150 faculty, department chairs, and departmental advisors have volunteered to coach and mentor students from the time they complete 25 percent of their program requirements until they graduate. The college has invested in extensive

training for mentors, part of which involves shadowing an academic advisor. Each academic coach and mentor is supported by a peer in student services. The idea is to build a strong network of support and guidance for students to help them choose and stay on a path to completion.

Regional career pathways

Ideally, the process of exploring careers and college should begin before students enter college. There have been many efforts to provide such opportunities to students while they are in high school. Generally, however, these efforts are not well-connected to the postsecondary paths that actually lead to jobs, and they are not easily scaled or sustained. Since 2009, Arizona State University has worked with community colleges throughout Arizona and even other states to create guaranteed transfer agreements based on the ASU academic maps. The maps show community college students which courses they need to take and in what sequence to be accepted with junior standing in a particular major. More recently, ASU has created a mobile phone app that enables students to explore what careers they might be interested in and provides information on ASU majors related to those careers. The app connects students (and parents, high school counselors, and other interested parties) with academic maps that indicate the sequence of courses that students should take at ASU (and what lower division courses students should take if they want to start at a community college) to pursue degrees in their field of interest. The app also indicates what courses students should be taking each year of high school to prepare for employment in that field. The overall vision, according to Maria Hesse of ASU, is to build pathways to postsecondary education in fields of economic importance for the

region starting in high school or even middle school. This would provide educators at the secondary and postsecondary levels and employers with a tool for monitoring how many students come through the pipeline in particular fields and a method to help guide students' decisions at key junctures along the way. What's different about this approach is that it starts with careers fields and then builds programmatic pathways downward through the educational pipeline from universities to community colleges and then to high schools and potentially middle schools as well.

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We want to emphasize that the practices described here are still relatively new and have not been evaluated rigorously. Still, in every case mentioned here, the institutions have seen improvements in student outcomes that could be attributed at least in part to reforms in the way these institutions have helped students to choose programs of study. ASU officials report that the university's fall-to-spring retention rates for first- time freshmen increased from 77 percent in 2006, when the institution began instituting academic program maps and exploratory majors, to 84 percent in 2010.[60] Since launching its Reinvention initiative in 2009, the City Colleges of Chicago has doubled its three-year graduation rate from 7 percent to 14 percent and has recorded all-time highs in the number of degrees awarded for the past three years.[61] Kennedy-King College, one of seven colleges in the City Colleges of Chicago system, received the "Rising Star" award from the 2015 Aspen Institute College Excellence Program for tripling its three-year graduation rate and exceeding by over 10 percentage points the rate at which underrepresented minority students either graduate or transfer to a four-year institution.[62] After instituting the freshman academies in 2009, Queensborough Community College's

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three-year graduation rate has increased from 12 percent for the 2006 cohort to 16 percent for the 2009 cohort—a 33 percent increase. When Guttman College's inaugural class started in fall 2012, the college set a goal of graduating 35 percent of the class within three years. By summer 2015, three years after they first entered, 45 percent of the students who entered in 2012 had earned an associate degree. In contrast, the median three-year graduation rate for community colleges in large cities is under 20 percent. To be clear, all of these institutions have implemented multiple reforms. Although none would claim that these improvements in student outcomes are due entirely to their efforts to redesign programs and supports to help students more easily choose and complete programs of study, all would say that such reforms have been key factors in the results they have achieved.

CONCLUSION

Postsecondary education plays a crucial role in preparing students to secure career-path employment, but for colleges to do this effectively, students need to be able to choose majors and associated careers that align with their own interests, abilities, and goals. The typical model of major selection emphasizes the role of information in matching students with particular characteristics to majors and careers with corresponding characteristics. Similarly, the college matching debate—with its concern for "undermatching"—also focuses on the use of information to match students with colleges that fit students' characteristics. We conclude that in both of these cases the conventional concept of matching is too narrow and that even significantly improved information will not achieve optimal outcomes for students and society.

In both cases, matching takes the demand and supply sides of the matches as fixed and directs attention away from changes that need to be made in those domains. For the college undermatching argument, significant improvements in equity and opportunity would require both improving the preparation of high school students so that more of them are higher performing, and improving the quality of broad-access institutions so that all students, whether or not they are high performing, can have access to high-quality higher education. In the case of major and program selection, students need to engage in an education process in which they explore their aptitudes and interests and develop relevant skills, but the majors and programs that they are choosing to enter must also be redesigned to make them more coherent and easier to navigate, and to better connect them to subsequent education and employment.

What needs to be done to bring this about? We have described some of the policies and practices that colleges are implementing to improve the major and program selection process. Here we summarize key approaches to improving the information students need to make a good match, but we also discuss potential changes in the supply and demand side of the match.

Certainly more, well-presented information would be helpful. Colleges can do a much better job of disseminating information about programs, program maps, transfer options, and jobs and earnings related to particular programs. We described the website developed by the City Colleges of Chicago, but there are similar model websites created by others, including Arizona State University in partnership with the Maricopa Community College District.

Colleges that have built more structured and mapped pathways for students have had to hire more advisors. Many colleges that have created more clearly structured or mapped program pathways for students and that have organized programs into broad exploratory majors have also embedded advisors in particular program areas so that they can develop deep knowledge of the requirements of their particular field and develop close relationships with students and faculty in that field.

Colleges need to be able to devote adequate time and resources to help students choose programs and make concrete plans. Technology or web-assisted advising ("e-advising") can be an important part of this process. College success courses or required group advising is probably necessary for many students. Currently, college success courses are often limited one-credit offerings that cover many things superficially—they are primarily designed to provide information about many activities and processes at the college.

To strengthen support for students to choose majors, community colleges and other broad-access institutions cannot rely only on web-based information and on the available advisors and career services staff. There are just too few of them. Rather, colleges need to engage students in an organized process of program and career exploration so that students can learn about both their interests and available options. Moreover, substantial time needs to be devoted to allow students to go through a process of discovering, developing, and reflecting on goals and objectives. However, many colleges are reluctant to devote more than one credit to this type of activity, because additional time would crowd out other courses. But if better plans and goals can improve completion and reduce the number of excess credits, then devoting more time to these

activities would be worth it. (In some states, this might require changes to in-state "credit cap" regulations.) Moreover, academic instruction can be incorporated into these courses so that students are both making plans and strengthening their skills. Guttmann Community College in New York has developed a six-credit first year course that combines career choice and planning and academic instruction.

Making decisions about major or program choice, developing plans to complete the requirements, and monitoring progress through those programs will be easier and more effective if programs are well-designed and easy to understand. They should be educationally coherent, with clear program learning outcomes tied to the requirements for further education and employment in related fields. Mapping out educational programs in coherent pathways not only makes them easier to negotiate for students, but it also enables faculty to ensure that students are mastering essential learning outcomes as they progress through programs. Ideally, faculty can build into the curriculum in-class and out-of-school experiences such as projects and internships that enable students to continue the process of career exploration and development even after they have chosen a major.

But creating more clearly structured and well-aligned program pathways requires colleges to allow and encourage faculty to engage in this type of work and to be able to consult with colleagues at the next level of education. All of the institutions mentioned as examples in this chapter have engaged faculty in this sort of program mapping within and across two- and four-year institutions. It is happening at a broader level in several states and cities, including Arizona, Florida, New York City, and Tennessee.

The process of career and major exploration should begin as early as possible, ideally starting in high school or even middle school. Institutions such as Arizona State University, University of Central Florida, and Florida International University are working with employers on one end, and with local community colleges and K-12 schools on the other end to build regional educational pipelines that help guide and prepare students beginning early on and extending through higher education for careers in fields of economic importance to their regions.

Creating more clearly structured and program pathways and building an integrated learning process through which students can explore career and major options and discover what path is well suited to their aptitudes and interests requires colleges to make major changes to the way they organize and offer programs and support services. Making these changes involves substantial costs and requires leadership and skill in managing large-scale change.[63] Why then are so many colleges, universities, and even state systems implementing reforms along these lines? A number of converging forces are creating strong incentives for them to do so. More than ever, a college education is a gateway to a family-supporting career. For most students the returns to a college degree remain high. Yet, particularly in light of cuts in state funding, the cost of even public higher education is rising. As students and their families have to pay more of their own money for a college education, they are going to want to be able to enter college programs that will lead as quickly and inexpensively as possible to jobs and further education that will put them on a career path. These consumer pressures, combined with growing restrictions on financial aid eligibility and increasing pressure from policy makers for improved graduation rates and shorter times to degrees, are putting pressure

on institutions to create career-focused programs and to help students complete these

programs in a timely fashion. This in turn is encouraging colleges to spend much more

time from the start in helping students explore career and major options and to choose a

program of study that is suited to their goals and talents and that they will therefore be

more likely to complete. As more colleges begin to experiment with different ways of

supporting students in this learning process, our currently limited knowledge of how to

effectively match students with majors well-suited to their talents and aspirations will

almost certainly be enriched to the benefit of students and society.

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