Intensity and Attachment: How the Chaotic Enrollment Patterns of Community College Students Affect Educational Outcomes

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Abstract

This study examines the relationship between community college enrollment patterns and two successful student outcomes—credential completion and transfer to a four-year institution. It also introduces a new way of visualizing the various attendance patterns of community college students. Patterns of enrollment intensity (full-time or part-time status) and continuity (enrolling in consecutive terms or skipping one or more terms) are graphed and then clustered according to their salient features. Using data on cohorts of first-time community college students at five colleges in a single state, the study finds that, over an 18-semester period, ten patterns of attendance account for nearly half the students, with the two most common patterns characterized by enrolling in one semester full-time or one semester part-time. Among the remaining students who persisted, there is astounding variation in their patterns of enrollment. Clustering these patterns reveals two relationships: the first is a positive association between enrollment continuity and earning a community college credential, and the second is a positive association between enrollment intensity and likelihood of transfer.

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1. Introduction

The study of student pathways through community college has become an important part of understanding the whole student experience. Student pathways are the time-ordered series of courses that students complete as they advance toward their education goals, typically program completion with a credential or transfer to a bachelor's degree program. Centrally related to student pathways are students' enrollment patterns—both the intensity of enrollment as measured by full-time and part-time status and the continuity or attachment of enrollment as measured by the consecutiveness of attendance. It is well known that few students who enroll in public two-year colleges go on to complete an award within two years of study (Radford, Berkner, & Wheeless, 2010). A key reason for this is that community college student pathways and enrollment patterns are anything but traditional; students routinely switch into and out of full-time and part-time status, and they frequently skip terms.[1]

Precisely how diverse student enrollment patterns are among students and the extent to which they are correlated with postsecondary outcomes have yet to be documented thoroughly. Although previous research has considered the relationship between starting as a full- or part-time student and educational outcomes (O'Toole, Stratton, & Wetzel, 2003) or has described the circumstance of mixed enrollment intensity (McCormick, Geis, & Vergun, 1995), investigators have not typically considered the full extent of diversity in enrollment patterns. It is important for institutions to track students and understand when they are at risk of abandoning their studies, but colleges have not yet developed the ability to distinguish between normal variations in students' education pathways and danger signs of potential dropout.

This study addresses two research questions:

(1) What are the enrollment patterns generated by community college students?

[1] Although four-year student pathways are becoming more varied over time as students attend multiple educational institutions and swirl between different types of institutions (Adelman, 2006), this study considers enrollment pathways of only those students who begin in the two-year sector.

(2) How are characteristics of these patterns related to postsecondary outcomes, such as earning a credential and transferring to a four-year institution?

Using data on two cohorts of students at five colleges in a single state, the investigation presented here reveals the diversity of enrollment patterns in terms of intensity and continuity that are generated by community college students along their educational pathways. The study employs a novel graphical technique to illustrate these patterns. In addition, the study aggregates thousands of enrollment patterns into six distinct types using a cluster analysis that combines patterns based on their main features. These clusters are found to be correlated with the probabilities that students will earn credentials and transfer to a bachelor's degree-granting institution.

Four key insights result from this analysis, some of which contradict the conventional view of how community college students progress. First, there are many unique patterns of enrollment generated by students over a five-year period. Second, categorizations of students as either part- or full-time based on first-term enrollment are largely inaccurate as they ignore the high degree of switching between these two attendance states. Third, it is particularly challenging to get students into and through programs of study when attendance is so varied. Finally, clustering enrollment patterns reveals that while continuity is more strongly associated with earning a community college credential than is enrollment intensity, enrollment intensity is more strongly associated with transfer to a four-year institution than is enrollment continuity.

The remainder of this paper is organized as follows. Section 2 briefly reviews relevant literature related to postsecondary enrollment intensity. Section 3 describes the dataset used for this investigation. Section 4 describes the empirical framework and findings. Section 5 presents a discussion of the findings, and Section 6 offers a conclusion.

2. Review of the Literature on Enrollment Patterns

The existing literature related to enrollment patterns can be grouped into two categories: studies that focus on students' first-semester experiences and those that look at student experiences over time.[2]

2.1 Initial Enrollment Intensity

Researchers often focus only on how students start college, or their intensity in the first term. Stratton, O'Toole, & Wetzel (2004, 2006) and O'Toole, Stratton, & Wetzel (2003) have performed various analyses of the 1990/94 Beginning Postsecondary Students Longitudinal Survey (BPS) to explore the link between enrollment intensity and dropping out of college among students in two-year and four-year colleges. Assessing differences between full- and part-time students, Stratton et al. (2004) concluded that older individuals and those in states with lower unemployment rates are less likely to enroll full-time.

Stratton et al. (2006) focused on differences in attrition rates among students who begin postsecondary education on a part-time or full-time basis. Their analysis recognizes that factors correlated with initial enrollment intensity may be correlated with the decision to drop out, leading to bias in simply estimating the effect of initial enrollment intensity on the probability of attrition. Modeling both the choice to enroll as a full- or part-time student and the decision to drop out as separate but related processes reveals that observable factors associated with dropout behavior differ by initial enrollment intensity. That is, there are different observable factors associated with attrition depending on whether a student begins as a full-time or part-time student. The authors found that parental education, timing of enrollment, college GPA, and local economic conditions are associated with attrition for full-time students but not for part-time students. Therefore, it is not initial part-time status per se that is correlated with attrition, but the underlying differences in observable factors that determine the correlation between full- or part-time status and attrition.

[2] Though closely related, this study does not cover the more general literature on theories of student persistence and attrition. For a historical overview that traces these theoretical models from Tinto (1975) to Bean (1980) to Metzner and Bean (1987) to Pascarella and Terenzini (1991), see Metz (2004).

2.2 Enrollment Over Time

O'Toole et al. (2003) produced one of few studies that relates initial enrollment intensity to intensity over time, revealing that using initial (first-term) full-time/part-time status underestimates the incidence of part-time enrollment intensity, as about one quarter of their sample stopped out or attended part-time for at least one term but still managed to graduate or continue to enroll at the end of five years.

More recently, Attewell, Heil, & Reisel (2012) used data from the National Education Longitudinal Study of 1988 (NELS:88) to conduct a study from the academic momentum perspective, which posits that students who accumulate credits more quickly improve their chances of completing a college degree, independent of academic readiness or socioeconomic status. Credit accumulation is intimately related to enrollment intensity, as full-time students more often accumulate credits more quickly. Attewell et al. examined four categorical indicators of momentum (no delay between high school and college, attending part-time in the first semester, taking 18 or more credits in the first semester, and enrolling in the first summer after freshman year) and used propensity score matching to identify average treatment effects of momentum on attaining a college credential. They found that graduation rates are lower for students who delay college entry and who take part-time course loads but found somewhat weaker positive effects on graduation for taking a large course load or enrolling in the first summer after freshman year.

Reports from the National Center for Education Statistics (NCES) have also addressed enrollment intensity over time in postsecondary education, though some of them are older, considerably broader in scope, and focused on four-year institutions. Relying on National Postsecondary Student Aid Study (NPSAS) data, McCormick, Geis, and Vergun (1995) analyzed college students during the single 1989-90 academic year and classified them as exclusively full-time, exclusively part-time, or mixed intensity. Their descriptive study discusses the characteristics of each of these groups. In his analyses of nationally representative sample of recent high school graduates from the NELS, Adelman (1999, 2006) found that students who attended full-time less frequently, did not enroll continuously, or were unable to earn at least 20 credits by the end of the first calendar year were much less likely to earn a bachelor's degree.

2.3 Contributions of This Study

The research reported here contributes to the literature on enrollment patterns in multiple ways. First, it focuses solely on community college students, rather than using a nationally representative dataset that combines college sectors or focuses on four-year colleges. A better understanding of students in two-year colleges can be obtained by studying them in isolation. Because they are more likely to have family responsibilities, to work full-time, to have greater financial constraints, and to be more academically underprepared than their counterparts in four-year institutions (Horn & Nevill, 2006), community college students attend college erratically and vary greatly in the rate at which they earn college credits.

Second, this study uses a longitudinal approach in identifying enrollment patterns. Most studies consider enrollment intensity in the student's first term as the most important aspect of intensity, and none have described the subsequent variation in intensity revealed as students progress along their pathways. Third, a new method for describing enrollment patterns is introduced that provides a visual representation of the entire diversity of enrollment patterns. To aid interpretation, the resulting patterns are clustered by intensity and continuity features, which in turn link enrollment decisions (such as switches from full- to part-time attendance) to postsecondary outcomes. This kind of representation could be useful in facilitating communication among faculty and other stakeholders about how community college students attend college, and it could help illustrate the link between aspects of enrollment patterns and postsecondary outcomes.

3. Data Overview

This study uses student-level data from five community colleges located in a single state in the United States. Since they are part of a centralized state system, the colleges participate in a common course numbering system and offer a similar set of degrees and certificates. Each college uses a semester system in which an academic year is defined as the fall and spring terms followed by a shorter summer term. The analysis sample comprises first-time-in-college (FTIC) students who began at one of the five

institutions in the 2005-06 or 2006-07 school year. The students are followed through the 2010-11 school year (18 terms or six academic years for the 2005 entering cohort, and 15 terms or five years for the 2006 entering cohort). The data collected are extensive, including both student demographic information and full community college transcripts. Credential attainment data were provided by the colleges, and data on transfer to other colleges came from the National Student Clearinghouse.

The sample consists of 14,429 degree- or transfer-seeking students. They generally intended to earn a certificate, diploma, or associate degree, distinguishing them from the block of community college students who enroll in shorter, non-credit vocational or adult basic skills programs.[3] Student data across the five colleges have been aggregated; the Appendix presents descriptive statistics.

4. Empirical Analysis

4.1 Patterns of Enrollment

This section begins by introducing a framework for analyzing patterns of enrollment, focusing on the characteristics of continuity and intensity. Intensity distinguishes between full-time and part-time enrollment, where full-time is defined as attempting 12 or more credit hours in the fall and spring terms and six or more credit hours in the summer term.[4] In general, a full-time course load means four courses in a 16-week fall or spring semester. Including summer terms forces a few nontrivial decisions. Taking at least one course in the summer is not uncommon, and it represents an important

[3] Students in the sample are considered degree- or transfer-seeking if they took placement exams or, when placement exam results were unavailable, they enrolled in credit-bearing courses and did not meet any of the following criteria: enrolled in non-credit vocational courses; enrolled in English as a Second Language (ESL), Adult Basic Education and Graduate Equivalency Degree (ABE/GED) programs; or enrolled dually in high school and college. Students who just seek to take some courses and not pursue a degree are generally not required to take placement tests.

[4] For full-time students, this is a standard division in the literature, as most financial aid and institutions require 12 credits for a student to be considered full-time. However, some researchers have considered nine credits as full-time. Colleges in the sample differ on the number of summer credits required to be considered full-time; some set the floor at six and others at nine. Students take, on average, between 13 and 14 credits in a term when they are designated as full-time and between five and seven credits when designated as part-time.

continuity in enrollment.[5] So as to not ignore summer enrollment or downplay its contribution to credit accumulation, this study treats it as a term like fall and spring.[6]

To aid exposition, all terms have been numbered so that each individual's first term of enrollment is term one, regardless of whether it is fall, spring, or summer. Of the three potential first terms of enrollment during the academic year, 68 percent of the sample started in fall, 24 percent in spring, and 8 percent in summer. Each subsequent term is numbered incrementally from the student's first term. This approach does result in some blurring of enrollment, as one student's term three will be fall and another student's will be summer. However, since community college students attend so haphazardly, this left-shifted numbering should not distort conclusions about the diversity of patterns or the clusters generated from the patterns. Nevertheless, there are some differences among students who started in different terms. Spring entrants were more likely than fall or summer entrants to skip their immediate second term, and summer entrants were more likely to enroll consecutively in the first three terms. That said, subsequent patterns for each group are still greatly diverse, and the qualitative story would be the same if each group were studied individually.

To describe enrollment patterns, I have created a vector of length 18 for each student that consists of a series of zeroes, ones, and periods.[7] The *i*th location of the vector is a `1` if the student enrolled in term *i* full-time, `0` if enrolled part-time, and a period if not enrolled. For example, a traditional student who begins in the fall and follows an idealized two-year degree track may enroll full-time in the first two terms and skip the summer term for two consecutive years. That student's vector would appear as:

[5] In an essay on a nationally representative cohort of students from NELS:88/2000, Adelman (2006) found that, "More than 60 percent of the students in the sample under investigation enrolled during summer terms. Undergraduates ... have shattered observance of the traditional academic calendar. Summer term credits are more than metaphors for high octane persistence: Earning more than 4 credits during those terms held a consistently positive relationship to degree completion, and gave African-American students, in particular, a significant boost in hypothetical graduation rates" (p. xx).

[6] About 8.2 percent of courses and 8 percent of credits are attempted during summer terms. In addition, 37 percent of students take at least one summer course. These numbers are sufficient to justify considering the summer term as an important data point in a study of enrollment attachment and intensity.

[7] This analysis combined data from the 2005 and 2006 cohorts. The maximum vector length is 18 for the 2005 cohort and 15 for the 2006 cohort, reflecting the amount of data provided for each cohort. Therefore the last three slots are necessarily non-enrollment periods for the 2006 cohort. Combining the cohorts may inflate the total number of patterns, but it does not change the substantive interpretation.

"11.11............."

A student who enrolls intermittently with different degrees of intensity may have a vector that appears as:

"01010..0..0..1...."

Over the 18 observed terms and 14,429 students in the sample, there are 4,594 distinct patterns of full-time, part-time, and non-enrollment. Though it is impractical to tabulate all of them, the ten most common types are shown on the top panel of Table 1 and ten of the least common patterns are presented on the bottom panel.[8] Of over 4,500 distinct patterns, the ten most frequent types account for 44 percent of students. The two most common patterns are for students who enroll either part-time only or full-time only in the first term (28 percent of students). These 4,000 students are generally the earliest dropouts, and their frequency is striking. Nevertheless, a small portion of them do earn short-term certificates (19 students) or transfer to a four-year institution sometime after that first term (595 students).

Although many of the students in the sample enroll sparsely, as suggested by the top panel, there are thousands of students who generate unique enrollment intensity patterns over a long period of time, as illustrated by those in the bottom panel. These students are characterized by several matriculation periods, gaps in enrollment, longer persistent states of attendance or non-attendance, and frequent switching among full-time, part-time, and non-enrollment status. In general, common patterns are short and unique patterns are long. The longer a student stays, the more likely the student's pattern will be unique. Few students who stay relatively longer do so in identical ways.

It is important to note that students usually stop enrolling after they graduate or transfer, yet the pattern representation used here does not provide any provision for formal exit. Among students captured in the top panel, 65 (about 1 percent) earned a certificate or associate degree.

[8] When broken out by fall, spring, and summer starters, the first two rows in Table 1 remain in the top position. The remaining top patterns differ in that the spring entrants are more likely to take an early term off and summer entrants are more likely to have early continuous enrollment.

Table 1
Enrollment Vector Patterns

Pattern	Frequency	Cumulative Percent
0.....	2,810	19%
1.....	1,190	28%
00.....	744	33%
11.....	561	37%
10.....	291	39%
11.11.....	175	40%
01.....	145	41%
0.0.....	140	42%
11.1.....	125	43%
00.0.....	115	44%
100.....0..0.....	1	99%
00.00.11.11.1.....	1	99%
11111.1100.....	1	99%
00.01.00.00.....	1	99%
10.1..11.11.1.....	1	99%
00.....0..0..	1	99%
10.00.10001.100...	1	99%
00..0.0.00.....0..	1	99%
10.11111111.....	1	99%
11.1..11011.1.....	1	100%

Note: In these vector patterns, 1 indicates enrolled full-time, 0 indicates enrolled part-time, and a period (.) indicates non-enrollment. The position of the number in the vector indicates the term number, from 1 to 18.

Certificate awards are concentrated in the second pattern and associate awards in the sixth pattern. The purpose of this paper thus far has been to introduce this method and draw attention to the impressive number of enrollment intensity patterns generated. The next sections show how one can visualize these patterns and draw conclusions from them.

4.2 Visualization of Enrollment Intensity and Continuity

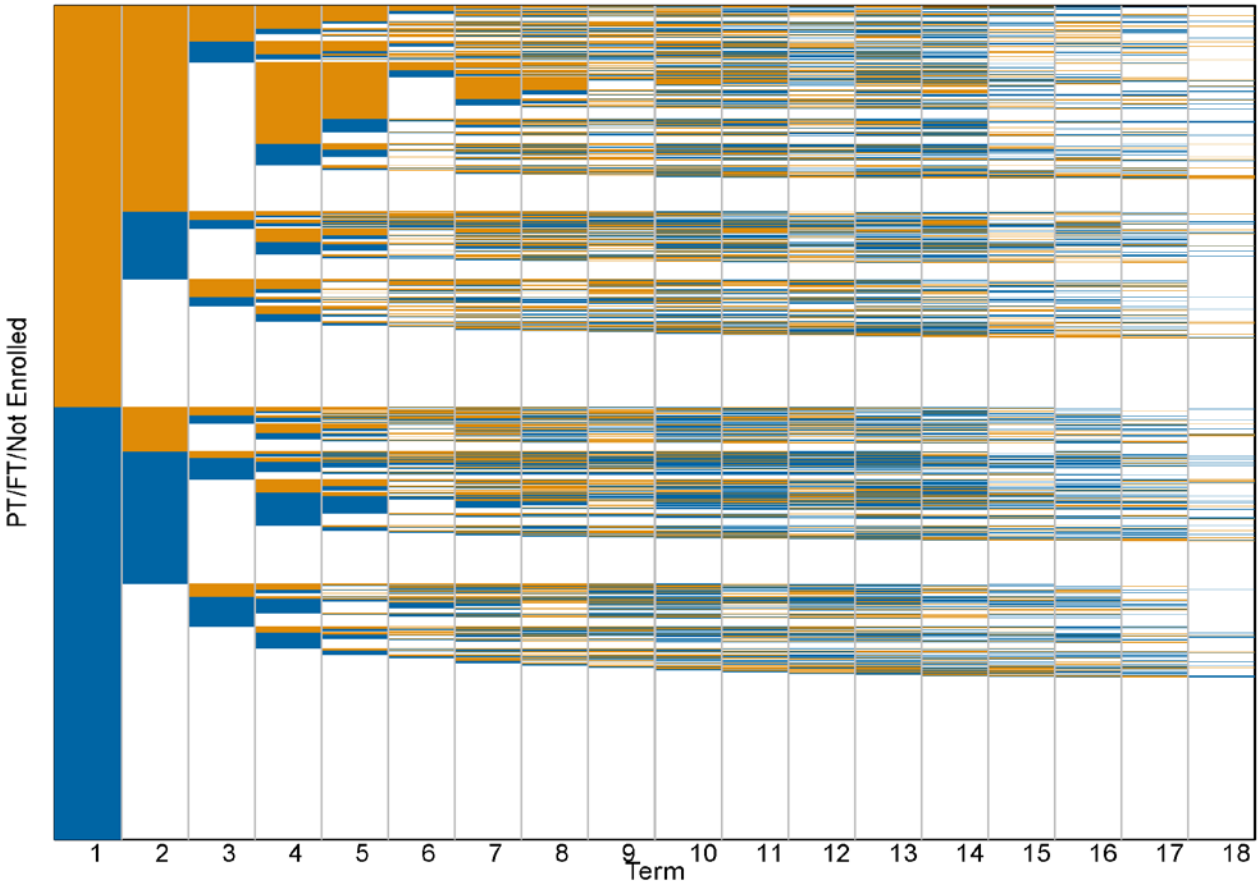
To better understand the entire range of enrollment patterns without tabulating every distinct type requires a graphical approach. A well-organized image can be constructed from the pattern vectors, providing a broad overview of the patterns and how they relate to graduation and transfer. I consider each student's vector as shown in Table 1 and stack them all on top of each other to create a matrix of 14,429 students by 18

terms. In the images that follow, student vector patterns are represented by thin bands of color instead of zeros, ones, and periods. The student vector patterns are sorted and stacked to create a matrix of student enrollment status by term where similar patterns are grouped together. The height of each resulting block of color in each term is proportional to the number of students it represents. The intuition is that in term one some students attend full-time and others attend part-time. In term two, the full-time students in term one attend full-time, attend part-time, or do not enroll, as do first-term part-time students. Students continue to be divided in this manner, term by term, and the resultant graphic representation uses three different colors for full-time, part-time, and non-enrollment status to illustrate the patterns.

Figure 1 presents an image of the enrollment patterns for all 14,429 students. White space indicates non-enrollment (no attempted credits), blue is part-time enrollment, and orange is full-time enrollment.[9] It is useful to think about the construction of the image from left to right. In term one, all students are either enrolled full-time (represented by the orange block of color in the top portion of the first column) or part-time (represented by the blue block of color in the bottom portion of the first column). As the terms progress and students switch their enrollment statuses, these blocks of color are subdivided to represent students' divergent enrollment patterns. Scanning across the image allows for the visualization of the wide variation of enrollment intensity and continuity after the first few terms.

[9] In greyscale, full-time enrollment is light; part-time is dark.

Figure 1
Image of All Enrollment Patterns



Note: Blue indicates part-time enrollment; orange indicates full-time enrollment; white space indicates non-enrollment. The height of each block of color in each term is proportional to the number of students it represents.

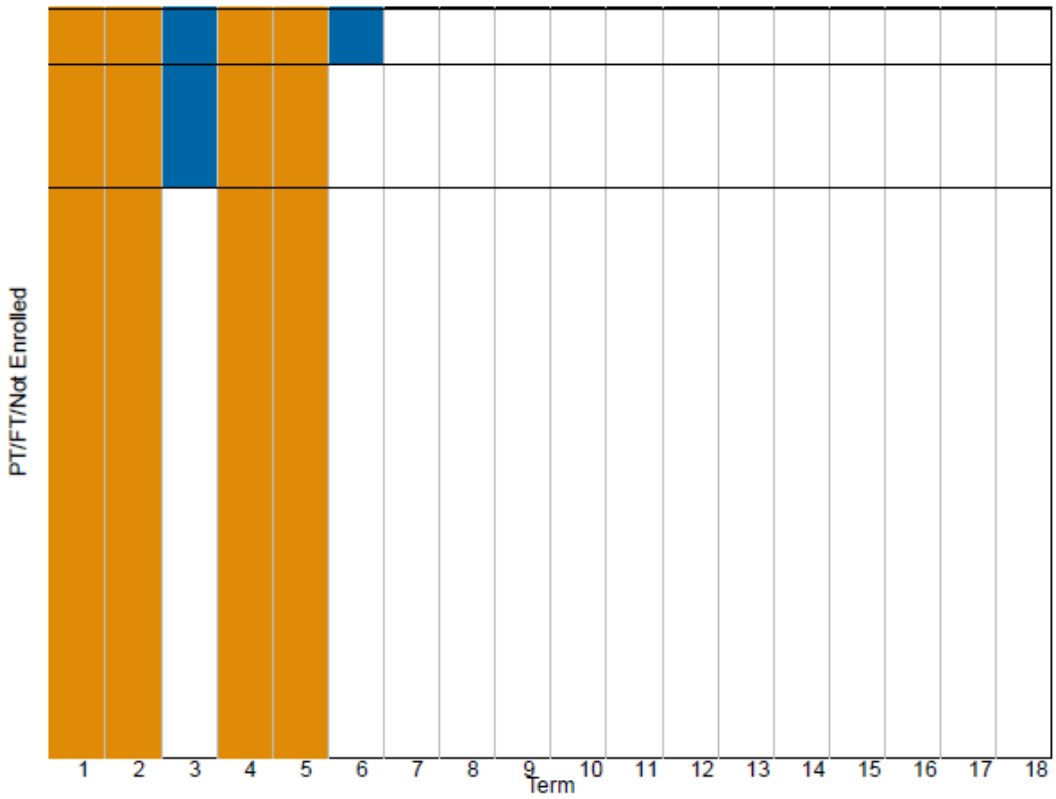
One can compare Figure 1 to what might be expected from a conventional view of student progression. Figure 2 shows what an enrollment graphic might look like if students followed standard pathways that begin with fall enrollment. The graphic is organized from the top down to express the following three enrollment intensity patterns, separated by black horizontal lines:

```
"110110............"
"11011............."
"11.11............."
```

Figure 2 thus shows what Figure 1 would look like in a world where all students follow some version of the conventional two-year pathway through community college.

These patterns are in reality particularly rare (even after including summer- and spring-entrant students). However, it is useful to contrast the homogeneity of Figure 2 with the heterogeneity of Figure 1.

Figure 2
Image of Traditional Enrollment Patterns

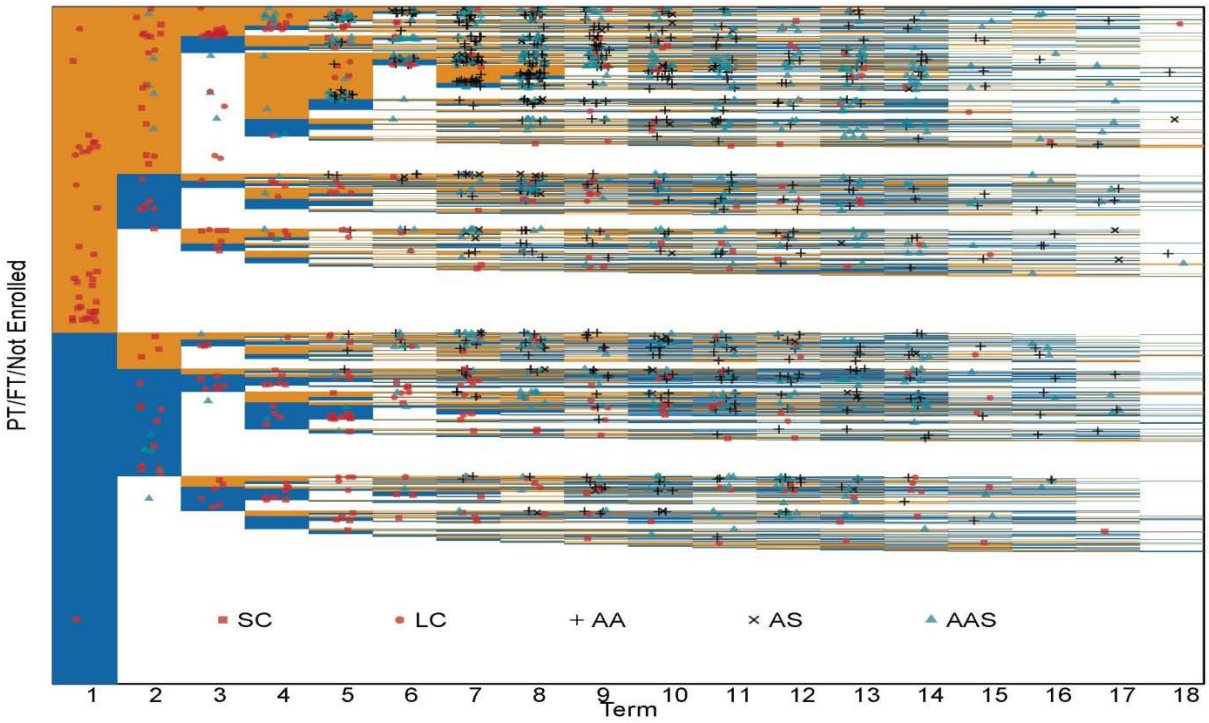


Note: Blue indicates part-time enrollment; orange indicates full-time enrollment; white space indicates non-enrollment. The height of each block of color in each term is proportional to the number of students it represents.

An immediate concern when looking at patterns like those of Figure 1 is that some students graduate or transfer out of the community colleges, and their doing so results in later periods of non-enrollment. It is possible to show the relationship between completion outcomes and enrollment intensity on these figures by overlaying indicator marks where and when completion outcomes occur. Figure 3 updates Figure 1 by adding indicator marks to show when students have earned a degree or certificate, and Figure 4 shows when students transfer by adding indicator marks (purple dots) that represent

students' first enrollment term in a four-year school.[10] Perhaps not surprisingly, credentials are most heavily clustered along the top of Figure 3, where students have more consecutive terms of full-time enrollment.[11] However, there are several examples of persistent students who manage to earn a credential after 12 or even 15 terms of part-time or intermittent enrollment.

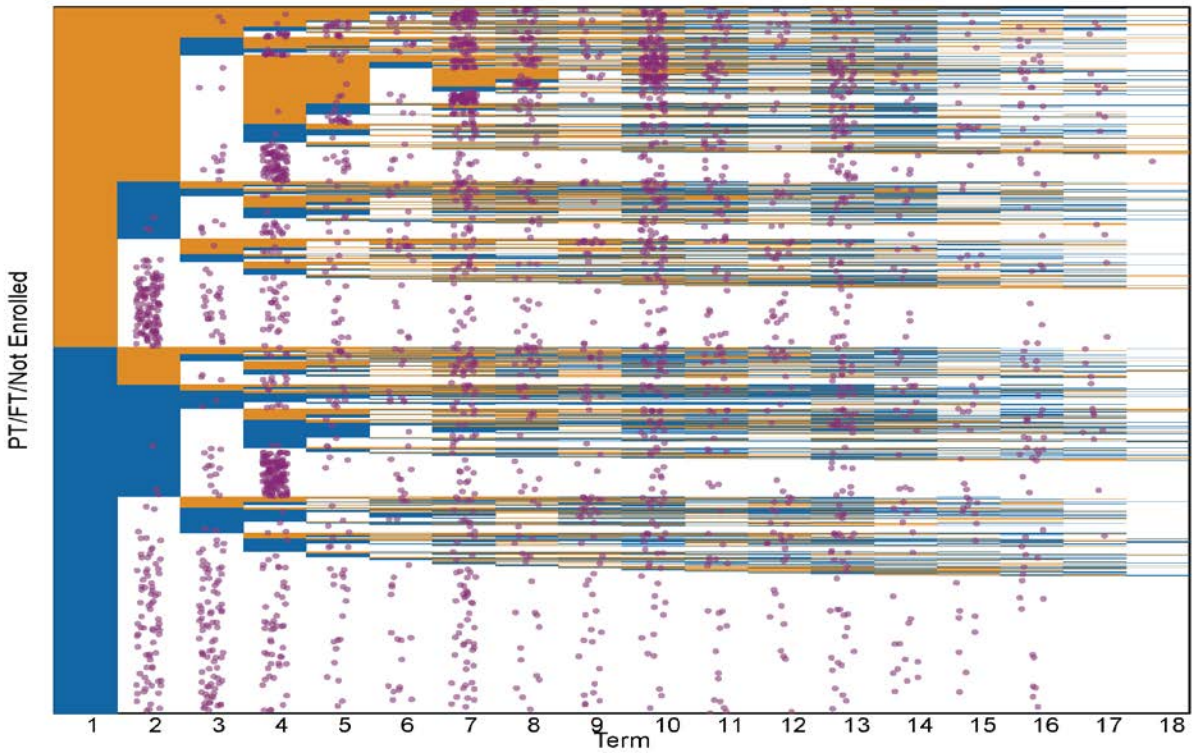
Figure 3
Image of All Enrollment Patterns Showing When Students Graduate



Note: Blue indicates part-time enrollment; orange indicates full-time enrollment; white space indicates non-enrollment. The height of each block of color in each term is proportional to the number of students it represents. An indicator mark shows that a student earned a credential. Legend entries for indicator marks, some of which overlap, are Short-term Certificate (244 students), Long-term Certificate (157), Associate of Arts (538), Associate of Science (56), and Associate of Applied Science (658). Some students have award dates in terms in which they have no enrollment record, resulting from late filing of award paperwork or a delay in recognizing transfer credit, among other reasons.

[10] Students are determined to have transferred if they have spent at least two semesters in a four-year institution.
[11] Completion outcome indicator marks in Figures 3 and 4 have been jittered slightly to avoid excessive overlapping.

Figure 4
Image of All Enrollment Patterns Showing When Students Transfer



Note: Blue indicates part-time enrollment; orange indicates full-time enrollment; white space indicates non-enrollment. The height of each block of color in each term is proportional to the number of students it represents. Each of the 2,656 purple dots, some of which overlap, indicate a student's first term enrolled in a four-year institution.

The indicator marks in Figure 4 that represent transfer show a few clusters where one would expect them to be. Some students transfer after one term of community college study, perhaps due to deferral from a four-year institution, spring admission to a four-year institution, or perhaps even co-enrollment at a four-year institution. Of the 148 students who attended in term one and transferred by term two, 4 percent began community college in the spring and 32 percent began in the summer. Others arrive at the four-year college during term four, which would likely be the first fall term after a full year of community college study. Terms seven and ten have clusters of transfers, a pattern expected of fall entrants who transfer to a four-year institution in a following fall term. Remarkably, the transfer patterns suggest a high degree of non-continuous postsecondary enrollment. Though most transferees leave after one or two community

college terms, many students depart community college and then wait years before enrolling in a bachelor's degree-granting institution. Still others engage in concurrent enrollment (as seen by transfer indicator marks inside of the blue or orange bars).

4.3 Summary of Vector and Graphical Analysis

The method presented here provides a readily available tool for describing student progress both quantitatively and qualitatively. Some key insights emerge from the vector and graphical analyses taken together. First, they reveal that students generate a lot of patterns due to intermittent enrollment and frequent switching between full- and part-time status. There are seemingly almost as many patterns of enrollment as there are students (4,585 distinct patterns for 14,429 students). Some students still enroll alternately full-time and part-time well into their sixth year of study (17 percent). About 1 percent of students follow the traditional fall-spring, fall-spring pattern (with a break for summer) during the first six terms, followed by no additional enrollment in subsequent terms. Some 28 percent of students have only one term of community college enrollment, and over one quarter of them never return after that first term. Almost 40 percent of students enroll in one term or in two consecutive terms and never return to either a two-year or four-year institution within the study's tracking period. Except for those who leave the institution early into their postsecondary careers, few remaining students have the same enrollment patterns in college.

Second, and related to the first, there is a lot of switching between full- and part-time status. In general, those who begin as full-time students are more likely to attend full-time subsequently, suggesting a much quicker rate of credit accumulation than for those who start part-time. However, students frequently switch between full- and part-time attendance (43 percent of students do so at least once.) About 69 percent of full-time starters who returned at least once had at least one part-time term. Half of part-time starters who returned at least once had at least one full-time term. This finding challenges the notion that starting intensity is indicative of future enrollment intensity (and it reinforces the findings of O'Toole et al. [2003] discussed earlier). Similarly, among students who enrolled in more than one term, 17 percent attended only full-time, 22 percent attended only part-time, and 61 percent attended a mix of part- and full-time.

About one quarter of students had two or more switches between full- and part-time status, and 32 percent of students had consecutive part-time enrollment. The high degree of switching challenges the common assumption that students can be identified as full- or part-time based on their status upon entering college.

Third, the patterns help explain why colleges have difficulty getting students into and through programs of study (Jenkins & Cho, 2011). The enrollment intensity figures reveal that students who persist are quite likely to experience a range of enrollment intensities over their college careers. Very few community college students follow a traditional fall-spring-fall-spring pattern with full-time enrollment in all terms (1.2 percent), the pathway that is often advertised by colleges as standard and that can be seen in suggested curriculum guides on college websites. Few students earn an associate degree in expected two years (3.5 percent). Over a six-year/18-term horizon, many students leave after their first contact with the college (28 percent). Only a handful of them complete short-term certificates or transfer to a four-year institution (15 percent of the 28 percent). In the cohorts under study, the typical student attended full-time in about 44 percent of the terms attended. Finishing a two-year degree within two years is bound to be uncommon when full-time enrollment is this low.

The enrollment patterns identified by the current study are remarkably varied and can be even described as chaotic; they raise several questions about the nature of the patterns. Why do full-time students switch to part-time and vice versa? Are there any differences in academic achievement between students who attend full-time consecutively compared with those who switch to part-time? What about differences in demographics or financial aid awards in the second term? Perhaps students simply cannot get into desired courses. Of course, a range of other factors (as well as the eventual attainment of postsecondary outcomes) will have an impact on whether, when, and how intensely students enroll.

4.4 Clusters and Their Relationship to Postsecondary Outcomes

Although there are thousands of distinct patterns of enrollment intensity, they are all generated from the same basic components: students attempt different course loads at different points in time. This section describes the pattern clusters based on the features

of the patterns that indicate degrees of intensity and continuity, enabling the production of a typology of enrollments, a more parsimonious way of thinking about the student behavior observed. Variation in postsecondary outcomes among clusters provides a way to correlate the features of patterns with outcomes. The study employs a k-means clustering algorithm that generates six clusters of enrollment patterns. The clusters are created solely from the information gleaned from enrollment intensity patterns and do not include other academic or demographic characteristics (see the Appendix for a description of the clustering algorithm.)

Though no researchers have performed work specifically to aggregate patterns of enrollment, previous research has incorporated enrollment intensity into a broader classification of student types. For example, Bahr (2010) has developed a typology of community college students using a similar cluster analytic technique. He built on earlier classification work (Ammon, Bowman, & Mourad, 2008; Hagedorn & Prather, 2005; VanDerLinden, 2002) that sought to identify broad types of community college students by combining behavioral data on course-taking and enrollment. Bahr used a very large sample of credit and non-credit students and focused on 13 enrollment and behavioral characteristics, such as units attempted in several subjects of study, enrollment intensity (mean units attempted per semester), course success ratios, and persistence (number of terms and years enrolled). Taxonomies such as this serve to illustrate the main types of students who are enrolling in these multiple-mission-oriented institutions and for what purpose. As Bahr noted, such an understanding can "assist policymakers, administrators, practitioners, and other stakeholders in directing and optimizing the use of limited resources to maximize the benefits received by students.… Additionally, the increasing attention of institutional accountability … has drawn attention to the need to distinguish students who enroll for differing objectives or desired benefits…" (2010, p. 726).

Importantly, the analysis presented here is related to but different from that of Bahr (2010) and his predecessors in that the emphasis is on aggregating the longitudinal patterns created only by variation in intensity and continuity of enrollment. The goal, however, remains to identify student types and provide a more parsimonious way of describing the enrollment patterns presented previously. Table 2 provides a summary of the clusters and their characteristics; Table 3 presents examples of patterns found in each

cluster using the method described above. Students are unevenly spread across clusters, as Cluster 5 has 5 percent of students and Cluster 2 has 35 percent. This spread of students into clusters is not unexpected as 44 percent of students generate the top ten patterns of enrollment. Below I describe the clusters and provide descriptive names.[12] (Appendix Figures A.1 and A.2 present visualizations of the clusters.)

[12] It is important to note that there is a level of subjectivity required in naming and describing the clusters as well as in choosing which variables to include in their creation. Though I tried to be as fair and objective as possible, I chose to focus on particular attributes in developing labels; other researchers might interpret the clusters somewhat differently. The clusters, of course, are a result of the particular measures that I considered for the algorithm. Since the focus here is on enrollment intensity and continuity, I omitted many factors that could be used in a more general clustering of students. It is thus possible and probable that I have omitted some important factors related to enrollment intensity that would have resulted in different clusters.

Table 2
Clusters of Enrollment Patterns Generated From K-Means Algorithm

											Consecutive							
Cluster	Name	N Students	Pct. Students	No. of Terms	Pct. FT	FT-PT	FT-FT	PT-PT	PT-FT	Non-Enroll	FT-PT	FT-FT	PT-FT	PT-PT	Switches	First Interrupt – 1 Term	First Interrupt – 2 Terms	First Interrupt – 3 Terms
1	Full-Time Persisters	2,858	20%	4.50	89%	0.07	0.61	0.02	0.03	0.50	0.03	0.45	0.01	0.01	0.47	3.25	5.55	6.12
2	Early Leavers	4,998	35%	1.25	30%	0.02	0.02	0.06	0.01	1.00	0.00	0.00	0.00	0.00	0.07	2.00	2.13	2.31
3	Early Persistent Switchers	1,958	14%	4.10	49%	0.28	0.10	0.12	0.21	0.53	0.22	0.06	0.05	0.14	2.01	3.06	4.36	5.23
4	Mostly Part-Timers	2,376	16%	4.12	6%	0.03	0.01	0.63	0.02	0.54	0.01	0.01	0.43	0.01	0.26	3.09	4.66	5.58
5	Early Attachers	728	5%	8.67	59%	0.21	0.32	0.16	0.18	0.20	0.19	0.30	0.14	0.16	3.29	8.13	9.63	10.00
6	Later Attachers	1,511	10%	9.28	49%	0.18	0.28	0.28	0.15	0.43	0.12	0.19	0.17	0.09	3.06	3.05	11.13	13.14

Note: Clusters were formed using k-means algorithm. *FT-PT* is a ratio of the number of changes from full-time to part-time enrollment to the number of terms enrolled, ignoring gaps. *Consecutive FT-PT* is a ratio of the number of changes from full-time to part-time enrollment in consecutive semesters to the number of terms enrolled. *Non-Enroll* is a ratio of the number of times an enrollment is followed by no enrollment to the number of terms enrolled. *First Interrupt – 1 Term* is the term in which the student experienced her first enrollment interruption of one term. *First Interrupt – 2 Terms* is the term in which the student experienced her first enrollment interruption of two consecutive terms.

Table 3
Sample of Vector Patterns Found in Clusters

Cluster	Example	Most Frequent
Full-Time Persisters	111111.....	11.....
Early Leavers	0...0.....	0.....
Early Persistent Switchers	11.01.....	10.....
Mostly Part-Timers	0..00.....	00.....
Early Attachers	11011..0.....	11011.....
Later Attachers	11.11.11.10.00....	11.10.00.....

Note: Each example pattern is one of several chosen for illustrative purposes.

Cluster 1: *Full-Time Persisters* (N = 2,858; 20 percent). These students enroll primarily full-time and for an average of 4.5 terms. They begin full-time and remain full-time, or begin part-time and change to full-time, where they remain. They have relatively few changes in attendance statuses compared with students in other clusters with a similar number of enrolled terms. For many of these students, their first part-time enrollment was followed by a long spell of non-enrollment.

Cluster 2: *Early Leavers* (N = 4,998; 35 percent). This largest cluster captures the students who enroll for the fewest number of terms (usually only one). Later enrollments usually occur well after the first enrollment term if at all, and there is virtually no consecutive enrollment. These students are thus characterized by very sparse enrollment.

Cluster 3: *Early Persistent Switchers* (N = 1,958; 14 percent). These students attend for four terms on average, about 50 percent of which are full-time. Almost all change intensities between the first two terms. They are likely to switch from full- to part-time attendance and then remain part-time, though they occasionally revert back to full-time. They have a relatively high number of switches between full- and part-time attendance. These students consecutively enroll in the first two terms but then have sporadic enrollment over the remainder of the time frame.

Cluster 4: *Mostly Part-Timers* (N = 2,376; 16 percent). These primarily part-time students have very few intensity changes. Much of this group might be described as first-year experimenters, enrolling only for two part-time consecutive terms, although some do persist into later terms. A few *Mostly Part-Timers* start full-time, but quickly lower their intensity and maintain a lengthy trail of part-time enrollment.

Cluster 5: *Early Attachers* (N = 728; 5 percent). This smallest cluster is characterized by almost nine terms of enrollment on average along with frequent switching between full- and part-time intensity. These students do not interrupt enrollment until the eighth term on average, into the third year of study, and most of the enrollment is full-time. Their enrollment is front-loaded in the earliest terms and highly consecutive. These students consistently attempt to earn credits term after term at any intensity possible.

Cluster 6: *Later Attachers* (N = 1,511; 10 percent). Students in this group also enroll for a long period of time—over nine terms, on average—but attend full-time less often than the *Early Attachers*. The students have a similar number of full- to part-time switches, but experience their first enrollment interruption earlier on, generally in their third term. That is, *Later Attachers* follow a more traditional approach of "two terms on, one term off," and they also have a high degree of persistence. This group is more likely to switch from part- to full-time attendance than the opposite, but has a lower level of consecutive full-time enrollment due to more interruptions.

The six clusters identify some student types that appear elsewhere in the community college literature. For example, the *Early Leavers* cluster is similar to the *drop-in* cluster of Bahr (2010), but perhaps with less favorable success rates. Like Bahr's clusters, those presented here also stratify along some demographic lines (though no demographic or environmental characteristics were considered in their creation). Table 4 presents demographic characteristics by cluster that show how some enrollment intensity and continuity clusters are correlated with individual characteristics (and how many are not). *Full-Time Persisters*, *Early Persistent Switchers*, and *Later Attachers* tend to be the youngest at about age 21, whereas *Early Leavers* and *Mostly Part-Timers* are age 25-26 on average. These findings are consistent with evidence that older students have different enrollment trajectories than younger students (Calcagno, Crosta, Bailey, & Jenkins, 2007). All of the clusters hover around a composition of 60 percent White students, ranging from 55 percent for *Mostly Full-Time Switchers* to 64 percent for *Later Attachers*. *Early Full-Time Persisters* and *Later Attachers* have the smallest Black student representation, at about 18 percent. Secondary education attainment is somewhat stratified across clusters, as students in *Full-Time Persisters*, *Early Attachers*, and *Later*

Attachers are more likely than students in other clusters to have traditional high school diplomas (rather than GEDs or no diploma). Large differences in first-term financial aid are found as well, as only 21 percent of students in the *Mostly Part-Timers* and *Early Leavers* clusters received aid compared with 45 percent of students in the *Full-Time Persisters* cluster. If data were available on dependency or working status, these would most certainly stratify clusters as well.

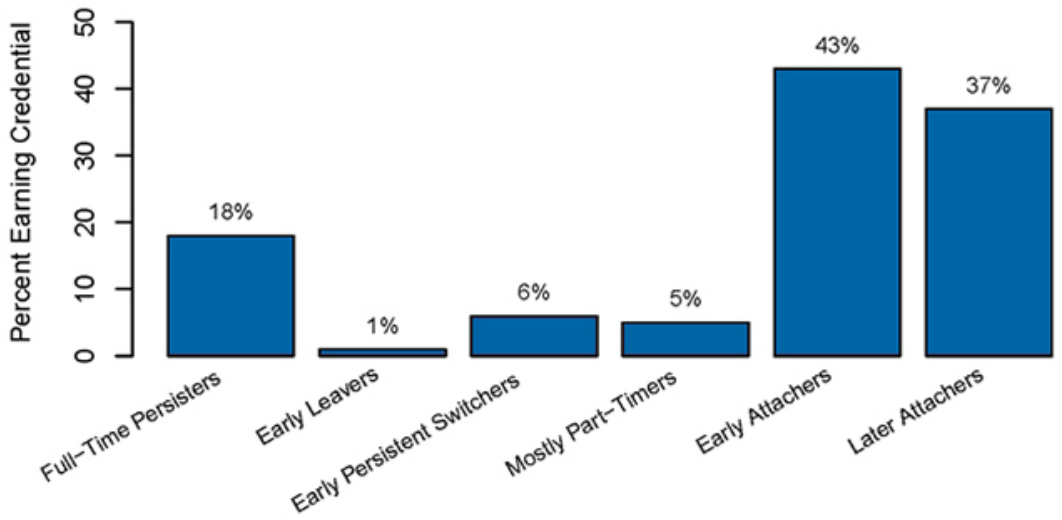
Table 4
Mean Student Characteristics by Cluster

Characteristic	Full-Time Persisters	Early Leavers	Early Persistent Switchers	Mostly Part-Timers	Early Attachers	Later Attachers
Female	49%	48%	50%	54%	52%	53%
Age	20.5	26.0	21.2	25.1	22.4	20.4
Age <= 19	81%	51%	75%	54%	70%	82%
Age 20-26	10%	18%	13%	17%	12%	9%
Age >= 27	9%	31%	12%	29%	18%	9%
White	62%	56%	55%	56%	58%	64%
Black	26%	31%	29%	28%	17%	18%
American Indian	0%	1%	0%	0%	0%	1%
Asian	2%	2%	3%	2%	6%	3%
Hispanic	3%	4%	4%	5%	4%	4%
Mixed Race	1%	1%	0%	1%	1%	1%
Nonresident Alien	6%	6%	7%	7%	14%	9%
HS Diploma	93%	87%	90%	85%	93%	94%
GED	3%	7%	6%	6%	4%	3%
No HS Diploma	4%	6%	4%	9%	3%	3%
Received Financial Aid in First Term	45%	21%	36%	21%	33%	29%
Received Pell Grant in First Term	34%	15%	27%	16%	22%	23%
SES Index	3.37	3.44	3.40	3.50	3.53	3.48
Developmental Education Assignment						
Overall	10%	8%	9%	8%	11%	9%
Math	13%	9%	11%	8%	15%	13%
English	56%	51%	55%	54%	57%	57%
Reading	52%	50%	49%	51%	55%	53%
Fall Entrants	83%	52%	72%	73%	72%	76%
Spring Entrants	12%	36%	19%	19%	15%	19%
Summer Entrants	4%	11%	9%	8%	13%	5%

There are no strong differences across clusters on a socioeconomic status index created from the variables shown on Appendix Table A.1, Panel B. Focusing on college readiness as measured by developmental placement, this investigation found that students in the *Early Attachers* and *Full-Time Persisters* clusters had higher overall college-readiness rates. Students in the *Early Leavers* and *Mostly Part-Timers* clusters had the lowest college-readiness rates overall and in each individual subject. These findings are congruent with the notion that better prepared students are more likely to persist and rapidly accumulate credits than their less prepared counterparts who enroll with hesitation (part-time) and become discouraged quickly.

Of more interest for this study is how postsecondary outcomes such as earning a credential or upward transfer correspond to clusters of enrollment patterns. Figure 5 shows the community college credential earning rates (within five years for the 2006 cohort and six years for the 2005 cohort) for each of the six clusters. Credentials earned include short-term and long-term certificates and associate of arts, associate of science, and associate of applied science degrees. The lowest rates, perhaps not surprisingly, are found among the cluster of *Early Leavers* (1 percent), the *Mostly Part-Timers* (5 percent), and the *Early Persistent Switchers* (6 percent). *Early Attachers*, have the highest graduation rate (43 percent) and the *Later Attachers* are not far behind (37 percent). The group of *Full-Time Persisters* has a credential earning rate that is somewhat lower than what one might expect for students who have so much full-time attendance (18 percent), mostly because they are transferring before earning a two-year credential.

Figure 5
Percentage of Students Who Earn a Credential Within Five or Six Years by Enrollment Pattern Cluster



Differences in transfer behavior in relation to enrollment pattern clusters help explain some of the variation in credential earning rates as well. As Figure 6 shows, transfer rates are higher than credential earning rates for all clusters except *Early Attachers* and *Later Attachers*. Notably, the first cluster of *Full-Time Persisters* has the second highest transfer rate (29 percent), suggesting that students in this group, who have more intense enrollment, seek to transfer without first obtaining a credential. Students in the *Early Attachers* cluster have the highest transfer rates and graduation rates (33 percent and 43 percent, respectively). Students in this highly attached group are earning a lot of credits early on, earning a two-year degree, and then transferring upward. Their outcomes are markedly different than those of the *Later Attachers*, who are earning a two-year credential at a slower pace and are less inclined to transfer to a four-year college within the observed time frame (14 percent transfer). The *Early Leavers, Early Persistent Switchers*, and *Mostly Part-Timers* have about the same transfer rates as the *Later Attachers* (14-15 percent), but *Later Attachers* have a much higher graduation rate of 37 percent.

Figure 6
Percentage of Students Who Transfer Within Five or Six Years by Enrollment Pattern Cluster

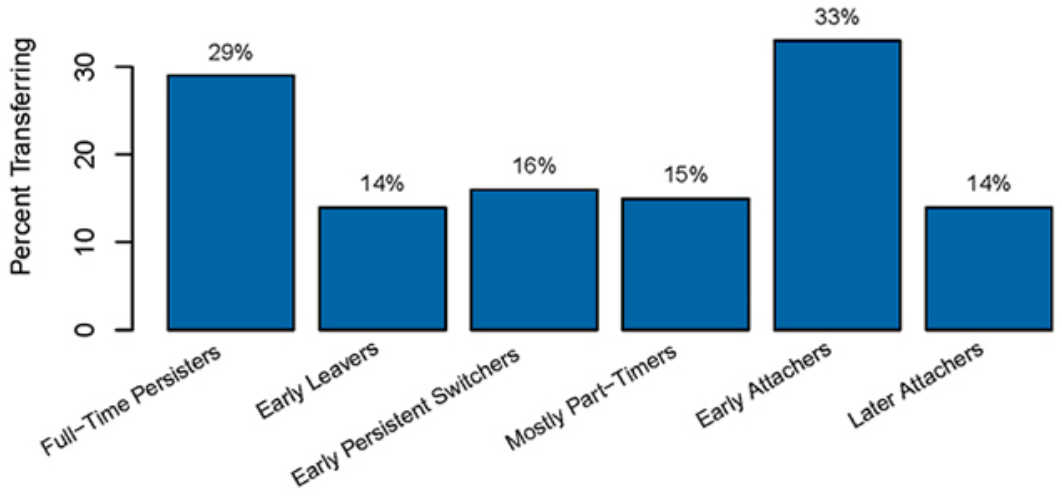
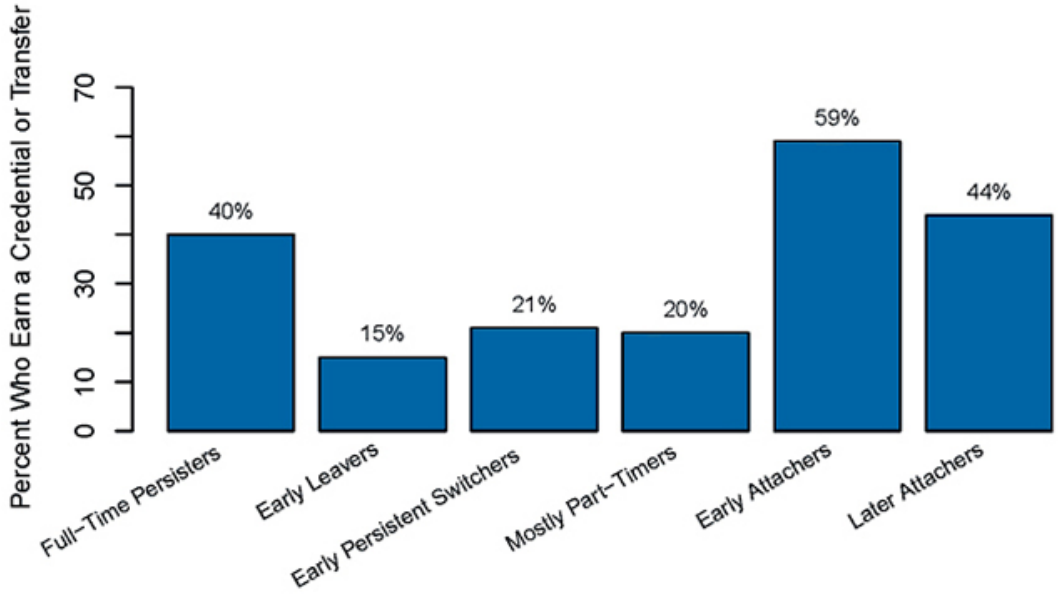


Figure 7 shows how the clusters vary for any of the two outcomes: earning a credential or transferring to a four-year institution. As expected, it is a blend of Figures 5 and 6, with *Early Attachers*, *Later Attachers*, and *Full-Time Persisters* having the highest likelihood of one of these outcomes. The implication again is that a combination of attached, intense enrollment with few breaks is associated with the greatest probability of transfer or earning a credential.

Taken together, the six clusters support the fourth main finding of this paper: students in groups characterized by high levels of enrollment continuity (*Early Attachers* and *Later Attachers*) are more likely to earn a credential than students in groups with low levels of continuity, and students in groups characterized by high levels of intensity and consecutive full-time enrollment (*Full-Time Persisters* and *Early Attachers*) are more likely to transfer to a four-year college than students in groups with low levels of enrollment intensity. Though not causal, these relationships suggest that taking breaks in enrollment (discontinuous enrollment) may be particularly harmful for students who desire to earn a credential and that part-time enrollment may be particularly harmful for

students who desire to transfer. For credential seekers, it is important to maintain consecutive enrollment; for transfer seekers, it is important to earn credits early. Although it does not appear that the frequency of switching between full-time and part-time states is detrimental, it is clear that groups identified by mostly part-time or discontinuous enrollment have lower credential-earning and transfer rates. Continuity of enrollment and full-time study are critical for student success.

Figure 7
Percentage of Students Who Transfer or Earn a Credential Within Five or Six Years by Enrollment Pattern Cluster



5. Discussion and Implications

In this study I have introduced a method for assessing community college students' enrollment patterns and describing their variation. I have also created a typology of enrollment comprised of six clusters of enrollment types based on the information gleaned from enrollment intensity and continuity patterns. This section first discusses why there is so much variation in students' enrollment patterns. It then addresses the ways that the method employed in the study, along with the research findings, may prove useful for stakeholders such as college administrators, policymakers, and researchers. The section concludes with some directions for further research.

5.1 Possible Reasons for Students' Enrollment Pattern Variations

Students change enrollment intensity in response to personal work, family, financial, and academic considerations, but it is not always clear whether the enrollment patterns that result from such decisions are optimal for students. Intensity changes and interruptions in general may reduce positive peer effects and interfere with momentum for students.[13] Reducing from full-time to part-time attendance (as *Early Persistent Switchers* and *Early Attachers* do) may improve educational outcomes for some students by providing more time to focus on fewer courses and academic obligations. However, it is also possible that employment and other extracurricular activities may consume newly freed time.[14] Reducing their course load may also be a response by students to poor academic performance. Students who do poorly in one term may respond by decreasing their intensity in future semesters (or by becoming discouraged and dropping out altogether). If the lighter intensity persists, students' rate of progress may be slowed significantly. It is, of course, possible that students may reduce intensity temporarily, perhaps due to short-term financial constraints or course availability, and then resume full-time attendance.

[13] There has been substantial research on summer learning losses for K-12 students, finding that skills and knowledge often deteriorate during the summer months, with low-income students facing the largest losses. Summer instruction is advocated as having potential to stop these losses and propel students toward higher achievement. See McComb et al. (2011) for a thorough review.

[14] Dadgar (2012) discusses how working while in community college affects credit attainment and GPA. She finds small negative effects of working on academic outcomes.

Similarly, students might change from part-time to full-time attendance if they feel more confident academically, see an improvement in their personal or financial situation, or experience an increase in motivation or desire to complete a program of study. It is also the case that such a change could occur if a student lost employment but could still finance a full-time load. Increasing enrollment intensity should speed up degree completion since it speeds up credit accumulation, and this effect should be magnified if switching to full-time persists and students do not revert back to low intensity enrollment.

It may also be the case that the structure of community college programs of study is related to enrollment variation. The highly flexible structure of many community college programs, in which students can drop in and out at will at the very least allows, but may also encourage, great variation in enrollment patterns. Community colleges are in many cases offering access to courses but not adequately facilitating program completion (Jenkins, 2011). Students who are in more coherent programs (such as nursing, for example) may be much more constrained in their ability to drop in and out and even to attend full- or part-time, but this may indeed promote stronger program completion. As Rosenbaum, Deil-Amen, & Person (2009) have noted in their comparison of private occupational colleges and public community colleges, the lack of structure in community college offerings can lead students to make bad, or at least suboptimal, decisions.

The patterns of enrollment intensity and continuity identified in this study are the result of choices made at different points in time under different constraints. Students do not randomly switch between full- and part-time enrollment, but rather act rationally (though not always optimally) in accordance with particular circumstances. The clusters provide a way of looking at groups of students who made similar decisions and asking important questions about their behavior. For example, the *Full-Time Persisters* cluster contains many students who did not return to college after their first part-time enrollment. Does this behavior lead to a diagnosis of part-time status as a harbinger of dropout? The largest cluster of *Early Leavers* consists of students who make a similar decision to stop enrolling after very little time at the community college. What cost-benefit analysis are

these students making that leads them to leave college so quickly? What factors contribute to this decision, and are the factors different for different groups of students?

5.2 Policy and Program Implications

Gaining a better understanding of the student experience is invaluable for various stakeholders. College personnel need to know that a sizeable number of students do not persist past the first term (e.g., *Early Leavers*) and that few students choose the most efficient or recommended path toward earning a credential. These facts alone should inform developmental education design, program of study design, and advising strategies. Administrators and faculty may not realize the wide variation in enrollment that their students experience. Chaotic and varied enrollment patterns (of, e.g., *Early Attachers* and *Late Attachers*) provide challenges for college administrators tasked with scheduling classes and determining staffing and resource requirements. Faculty members should be aware of the high likelihood that many of their students have significant interruptions in their enrollment and have departed from any type of "traditional" college pathway.

Acknowledging the range of patterns is important for policymakers as well. They should realize that credential completion or transfer for community college students may take longer than two or three years, and that there may be policies and incentives related to financial aid, tuition, and placement testing that reinforce the suboptimal pathways taken by students. For example, policies surrounding the number of terms that Pell grant awards are available may make sense for most four-year college students but little sense for persisting community college students. The total number of terms for Pell eligibility was recently reduced to 12 from 18, a policy change that might hinder completion for many community college students. When designing metrics for evaluating college performance, policymakers should consider that college enrollment patterns range from those characterized by *Early Leavers* to *Early Attachers*—these different types of students make very different choices after their first contact with the college and may have different goals.

5.3 Implications for Future Research

The analysis presented here should give pause to researchers studying community college student behavior who are analyzing panels of short time periods. They face

significant limitations in capturing the student experience. Similarly, researchers working in longitudinal frameworks should understand how the diversity of enrollment patterns impacts studies of educational timing. Many studies often use initial enrollment intensity when examining postsecondary student behavior and outcomes. First-term intensity may be a useful proxy for unobservable characteristics such as self-esteem and perceived academic ability as much as it is a function of financial and time constraints. However, it does not always indicate future enrollment intensity. Researchers studying transfer should be aware that the transition from two- to four-year college is often not immediate, requiring a close look at the timing of transfer.One potential area for further research is the development of a model that can generate the observed enrollment patterns. Similar to Stange (2012) and Keane and Wolpin (1997), the strategy—though computationally complex—could model the dynamic decision-making process (enroll part-time, enroll full-time, work full-time, stop out, etc.) of these students over the life cycle. Researchers could then carry out policy simulations to study how enrollment decisions and postsecondary outcomes would change in response to changes in: opportunity costs of going to college, tuition, self-assessment of academic ability (based on experiences at college), institutional structures, and remediation placement policies, etc.

A second area of research could explore changes in enrollment intensity more closely. Does switching between full- and part-time enrollment help or harm students? That is, is it better for students to have consistent enrollment of one type or to just accumulate credits in any way possible? Is a switch from full- to part-time attendance undesirable? Does such a switch imply greater part-time attendance in subsequent terms? Related to these questions is the issue of modeling changes in enrollment intensity. Can one predict when students are likely to have a gap in enrollment, change intensities, or simply enroll in the next semester full- or part-time? What characteristics are associated with these transitions?

A third important area of study concerns transfer. Many students enter the community college with the desire to transfer to a four-year institution. However, as Figure 3 shows, transfer pathways vary considerably across individuals. Students transfer at many different points in time with varying numbers of transferable credits. There has been some research exploring the nature of upward transfer (see Long & Kurlaender,

2009), but there still remain several outstanding questions concerning enrollment patterns, transfer, and baccalaureate completion. For example, are the patterns associated with successful upward transfer related to completion of a bachelor's degree as well? And how do disruptions between community college enrollment and four-year college enrollment affect degree completion?

6. Summary and Conclusion

This paper presents a way to conceptualize and visualize community college enrollment patterns and to cluster them by their characteristics. It uses student-level data from a sample of 14,429 degree- or transfer-seeking FTIC students from five community colleges located in a single state who began in the 2005-06 or 2006-07 school year. After five to six years, most of these students forged paths that are not highly productive or efficient. The diversity in individual patterns cannot be understated—although nearly half of the students followed about ten patterns (most of them associated with early attrition from college), the remaining students took thousands of distinct pathways involving full-time, part-time, and interrupted enrollment. Characterizations of students as either part- or full-time are thus largely inaccurate as they ignore the high degree of switching between these two enrollment statuses. The chaotic enrollment patterns of students illustrated in this study pose challenges for colleges and other stakeholders in helping students enter and complete programs of study.

Clustering these enrollment patterns based on intensity, persistence, interruption, and frequency reveals six major pattern types. The most favorable graduation outcomes are associated with students who tend to enroll term after term with few breaks. The most favorable upward transfer outcomes are associated with students who tend to enroll full-time rather than part-time. Continuity of enrollment and full-time enrollment whenever possible are keys to community college success.

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Appendix

K-Means Clustering Algorithm

K-means is a "hill-climbing" algorithm that seeks to maximize the differences between clusters and minimize the differences within clusters (Hastie, Tibshirani, & Friedman, 2009). Variables used in the clustering algorithm are strictly related to the patterns generated by student course-taking. They include the total number of terms enrolled, the percentage of full-time terms, the number of full- to part-time, part- to full-time, full- to full-time, and part- to part-time transitions as a percentage of the number of terms (both with and consecutively or without gaps), the total number of transitions between full-time and part-time states, and the locations of the first breaks in enrollment of one, two, and three terms (to capture shorter and longer stop-out behavior). All variables are scaled such that their means are 0 and standard deviations are 1. I executed the algorithm so that it produced three to ten clusters and determined that six clusters had good separability by within sum of squares measures.

Table A.1
Sample Student Features

Panel A			
Student Characteristic	**Mean**	**SD**	**N**
Female	0.501	0.500	14,429
Age (continuous)	23.341	9.062	14,426
Age <= 19	0.652	0.476	14,426
Age 20-26	0.141	0.348	14,426
Age >= 27	0.207	0.405	14,426
White	0.579	0.494	13,833
Black	0.272	0.445	13,833
American Indian	0.005	0.067	13,833
Asian	0.026	0.160	13,833
Hispanic	0.040	0.196	13,833
Mixed Race	0.006	0.080	13,833
Nonresident Alien	0.071	0.258	13,833
HS Diploma	0.892	0.311	14,327
GED	0.053	0.224	14,327
No HS Diploma	0.055	0.229	14,327
Received Financial Aid in First Term	0.294	0.455	14,429
Received Pell Grant in First Term	0.216	0.412	14,429

Panel B		
Quintiles from Census-determined Neighborhood	**Frequency**	**Percent**
Average Household Income		
1	1,264	9.1
2	1,370	9.9
3	1,746	12.6
4	2,687	19.4
5	6,780	49.0
Bachelor's Degree or Above		
1	1,217	8.8
2	1,425	10.3
3	1,923	13.9
4	3,127	22.6
5	6,155	44.5
Employed in Management/Professional		
1	1,692	12.2
2	1,642	11.9
3	2,047	14.8
4	2,992	21.6
5	5,474	39.5
Non-English Spoken at Home		
1	1,388	10.0
2	1,336	9.6
3	2,192	15.8
4	4,314	31.2
5	4.617	33.3
Percent with Healthcare Coverage		
1	4,539	32.8
2	3,832	27.7
3	2,498	18.0
4	1,510	10.9
5	1,466	10.6

Panel C		
Education Level	**Frequency**	**Percent**
Developmental Education		
College Level	1,021	9.0
One Subject	4,212	37.1
Two Subjects	2,680	23.6
Three Subjects	3,432	30.3
Math Developmental Education		
College Level	1,214	11.0
One Level Below	1,638	14.9
Two or More Levels Below	8.171	74.1
English Developmental Education		
College Level	5,760	54.5
One Level Below	2,535	24.0
Two or More Levels Below	2,276	21.5
Reading Developmental Education		
College Level	5,506	51.2
One Level Below	3,215	29.9
Two or More Levels Below	2,033	18.9

Figure A.1
Enrollment Patterns for Full-Time Persisters (top), Early Leavers (middle), and Early Persistent Switchers (bottom)

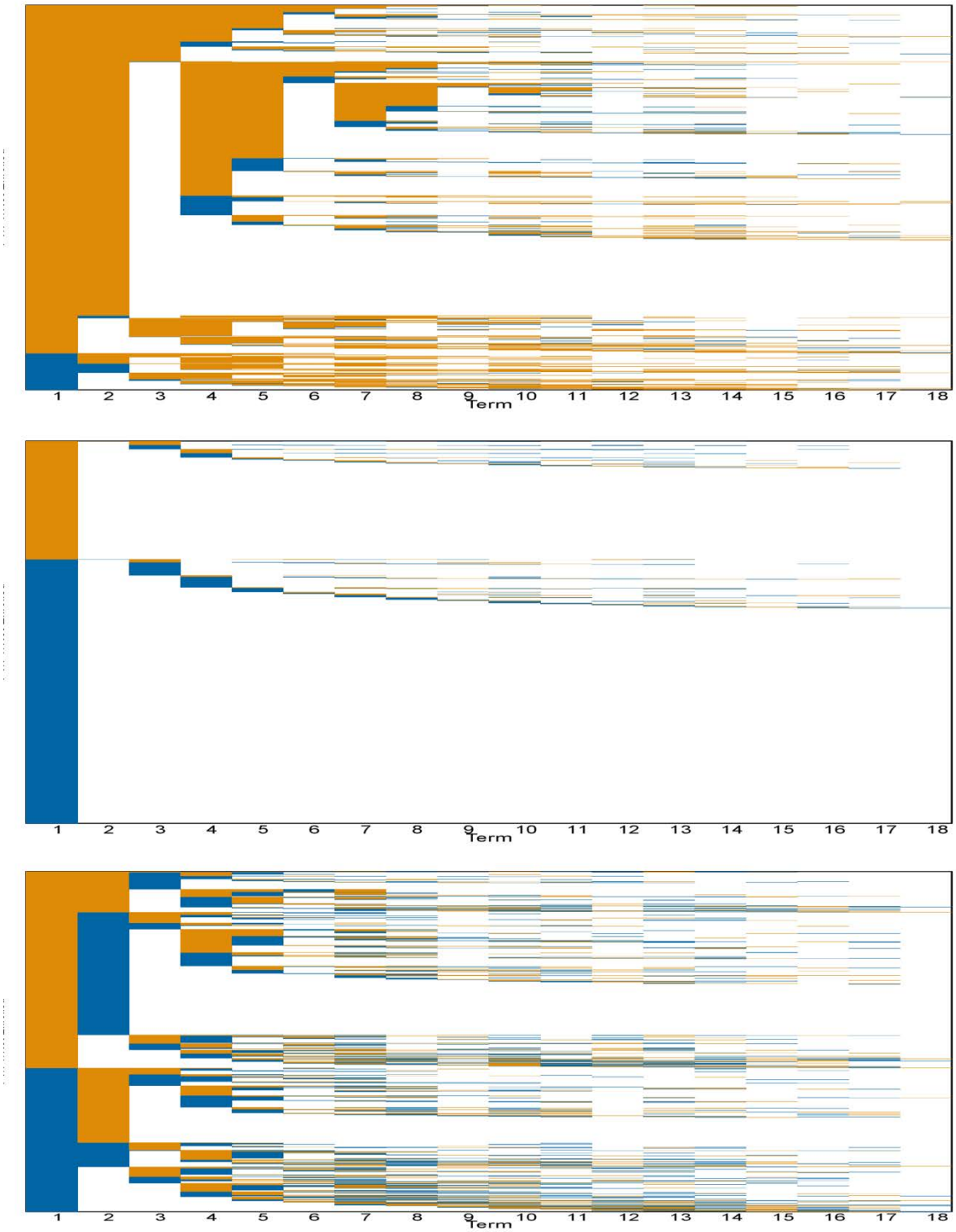

Figure A.2
Enrollment Patterns for Mostly Part-Timers (top), Early Attachers (middle), and Later Attachers (bottom)