CCCS Support for College Readiness: 2008-2018

An Overview of Developmental Education and Supplemental Academic Instruction Offerings at the Colorado Community College System

Executive Summary

Since 2014, the thirteen colleges of CCCS have implemented a new model for providing College Readiness (CR) Support to CCCS students. This model shortened the college readiness sequence, merged the developmental reading and writing tracks into a single sequence, and offered Supplemental Academic Instruction (SAI) courses. Additionally, CR math courses were redesigned to offer separate support tracks depending on whether a student planned to register for algebra or non-algebra course. In the framework, most students complete their CR requirements in one semester by either taking a developmental education (DE) course or a supplemental academic course (SAI) to ensure that they are prepared for college level course work in math or English.

Each CCCS college has its own approach to College Readiness Support course offerings and services. All colleges offer the SAI option in reading/writing. As of this report, not all colleges were offering an SAI option in math, but all colleges have plans to implement an SAI option in math for the 2019-2020 academic year. Some colleges require co-requisite enrollment in study skills courses in addition to SAI and DE courses; several colleges offer additional "boot camp" style summer programs for new students. One college enrolls all math students without a college readiness indicator in the college level course appropriate for their program of study with an SAI course. Several CCCS colleges have abandoned the traditional college readiness ACUPLACER test and instead use self-guided surveys to place students in math and reading/writing courses. Currently, CCCS is exploring a system-wide implementation of a multiple measure placement process. Such variety and innovation of course offerings and approaches to College Readiness Support provide many opportunities for future research.

Enrollment in College Readiness Support courses has declined since 2008. This decrease aligns with enrollment trends of CCCS colleges in the past ten years, peaking in the 2010-2011 academic year and declining as economic conditions in the state improved. This study shows that students who complete their college readiness requirements through DE courses and through SAI courses are successful in their college level gateway course in both math and reading/writing. The data also shows that more than 50% of students in both math and reading/writing who complete their college readiness through a DE course do not enroll in the college level gateway course. In addition, students of color enroll in college readiness courses at a higher percentage than their white peers. More importantly, students of color complete the college gateway course, whether they first took a DE course, were co-enrolled in a SAI course, or placed directly in the college level course, at a lower rate than their white peers.

In addition to this report, the CCCS Support for College Readiness includes a year by year analysis for each year from 2008-2009 through 2018-2018; a system report for math and reading/writing that disaggregates the data by race, ethnicity, age, gender, and Pell eligibility; individual college reports for both math and reading/writing that disaggregates the college data by race, ethnicity, age, gender, and Pell eligibility; and a survey that describes how each college is currently offering College Readiness Support. All of these documents have been provided to the leadership at each of the CCCS colleges and are available upon request.

Introduction

Support for College Readiness in the Colorado Community College System

The Colorado Community College System (CCCS) provides an accessible learning environment for all students. Many students entering CCCS programs need extra support in the early part of their college career while they acquire the skills needed to succeed in college-level coursework. The colleges in CCCS have responded to this need by reforming assessment practices and college readiness support practices. The present report will:

- Describe developmental courses and course sequences offered by CCCS colleges over the previous ten academic years
- Provide an overview of the shifting demographic composition of students registering for developmental coursework
- Examine the success rates of students taking developmental coursework through several metrics, including:
    - developmental course success
    - progress to success in college-level coursework
    - success in college coursework

Presenting these figures will provide an overview of several aspects of college readiness support at CCCS. This report will provide a baseline for further discussion and evaluation of college readiness support at CCCS. Several key areas of research and suggested approaches are presented in the report's conclusion.

This report differs in terms of scope and methodology compared to reports on similar topics prepared by CCCS in previous years. Previous reports provided information about the full population of students taking college readiness coursework at CCCS in a given academic year. Thus, if a student continued a college readiness sequence through multiple academic years, those students would be counted in both years, which complicated comparisons of student outcomes between academic years. The present report, while providing full registration summaries, also examines the performance of new student cohorts to facilitate these comparisons.

To ensure that the time periods examined by previous reports can be analyzed within this methodological context, this report includes information on CCCS developmental coursework activity beginning in the 2008-2009 academic year through the 2017-2018 academic year. Depending on system goals and state mandates, future reports will likely only include information on the present academic year and updates on cohort performance from the last three to five academic years.

Terminology Used in this Report

This report uses the term, "College Readiness Support" to describe the activities examined. Many terms, including "remedial education," "basic skills," "developmental education," and others have been used over the years to describe the additional coursework prescribed by colleges for students who are assessed or self-assessed as not prepared for college level coursework in English composition or mathematics. The lack of a standard vocabulary within education research and education policy

discussions on the topic can lead to confusion when discussing college readiness activities. In the present report, the following terms will be used to describe two distinct methods of college readiness support:

College Readiness (CR):
While not a standard term in discussions on the topic, this report is using the term College Readiness Support" (abbreviated as "CR" in some places within this report) to describe both developmental/prerequisite and supplemental/co-requisite support courses.

Developmental Education (DE):

Developmental education courses -- often abbreviated as "DE" -- are prerequisite courses intended to offer remedial training in basic subject-specific academic skills. Many reports and articles on this topic use "developmental education" as an umbrella term to cover both co-requisite and prerequisite college readiness activities. However, the state of Colorado is moving toward consistently using the term "Developmental Education" to refer to prerequisite coursework below the college level. Developmental courses are intended to teach and build foundational skills prior to registering for college-level coursework.

Supplemental Academic Instruction (SAI):

In contrast to DE courses, Supplemental Academic Instruction (SAI) courses are co-requisite courses offering remedial training in basic subject-specific academic skills. These courses allow students assessed (or self-assessed) as not yet college-ready to take college-level courses with additional academic support. SAI is sometimes framed as an alternative to the DE approach that presents fewer barriers to college course registration and completion while also offering "just in time remediation" that directly connects foundational skills and their application in college-level coursework. Currently, most CCCS colleges offer SAI courses to students assessed as being close to college-ready, while recommending DE courses to students with low evidence of college-readiness.

Gateway Courses

"Gateway courses" are 100-level college courses that are required for completion of an associate's degree and often act as prerequisites for higher-level coursework. The college readiness courses discussed in this report are intended to prepare students for gateway courses in English (ENG 121, English Composition I) and math (college level, but non-transfer Career and Technical math courses like MAT 103, Clinical Calculations; MAT 107, Career Math; MAT 108, Technical Mathematics; MAT 109, Geometry; and MAT 112, Technical Mathematics; or college transfer courses like MAT 120, Math for Liberal Arts; MAT 121, College Algebra; MAT 123, Finite Mathematics; or MAT 135, Intro to Statistics; depending on a student's course of study).

Course Success

In this report, success in a course is defined as earning a grade of C or better. All registered students -- including students who withdrew after the drop deadline -- are included in the denominator of course success percentage statistics.

Design of the Present Report

The body of this report is divided into two sections. The first section provides a narrative overview of changing college readiness practices at CCCS supplemented by CCCS registration data. The second section includes a summary and suggestions for next steps in examining CR support at the Colorado Community College System.

Also available to our colleges are year-by-year analysis of student enrollment and completion data for ten years, from 2009 through 2017-2018. Cohorts examined in the year-by-year analyses consist of all new and transfer students registering for coursework at one of the CCCS colleges during the summer or fall semesters who registered for a college readiness support course in that academic year and/or a related gateway course within the analysis window. For the 2016-17 and 2017-18 academic years, the analysis window consists solely of the academic year; the analysis window covers the students' first three academic years for earlier cohorts. In years prior to 2013-2014, there are two cohorts: DE and College-level. In chapters detailing later academic years, an additional cohort is added consisting of students taking their initial gateway courses with SAI co-requisite support courses.

This cohort-focused analysis is a departure from prior analyses that included college-readiness registrations by continuing students in year-by-year analyses. By focusing on new entrants into the system, students' earliest college readiness courses can be more reliably identified, and double-counting student outcomes between years avoided. Including a college-level comparison cohort provides some insight into the efficacy of support courses and/or placement practices in closing skill gaps.

Prior Research on College Readiness Support

Studies and reports on developmental education, supplemental academic instruction, or other forms of college readiness support rarely provide a comprehensive overview of the topic. Instead, discussion within publications focuses on individual aspects of the college readiness model such as the validity of placement methodology or the performance of students taking support courses between different support modes or in comparison to other student populations.

The accuracy and effectiveness of various college readiness assessment approaches is a major topic of research related to college readiness support. Recent articles addressing this topic include Ngo and Melguizo (2016), who compare the efficacy of using the Accuplacer computer-adaptive test which produces single scores to diagnostic instruments that produce a report on discrete student competencies in assessing student preparedness in math. The authors find that moving to a computer-adaptive test was associated with decreased advancement to completion of a college level course and suggest that misassignment of students to a low-level support course might contribute to this effect. Questions about the validity of single placement test options have led to a great deal of interest in using multiple measures to determine student college-readiness. Bahr, et al. (2017) have presented preliminary evidence for the validity of a multiple measures approach using data from California community colleges; a study of the use of multiple measures for course placement in New York state by the Center for the Analysis of Postsecondary Readiness released a report in 2018 suggesting that this approach to assessment leads to higher rates of college-level placement (Barnett, et al., 2018). CCCS colleges currently use a variety of approaches to determine college readiness, including multiple measures and self-placement. A randomized controlled experiment comparing these approaches is currently under development.

Another major topic of discussion related to college readiness is the relative effectiveness of different modes of college readiness support. Most of this discussion concerns methods of accelerating progress toward the college level in order to reduce attrition. Advocacy groups such as Complete College America promote findings that show improved rates of college course completion among students registered in co-requisite SAI courses as opposed to prerequisite DE courses (e.g., Complete College America, 2015). Although the over-assignment of students to developmental courses and the benefits of co-requisite supports are likely related, there is little published research examining the intersection between these factors, possibly because support models other than prerequisite DE have only recently been implemented at scale in American community colleges.

Although the theory underlying college readiness (CR) coursework implies that additional instruction and/or practice will help under-prepared students succeed in more advanced coursework, changes in student competencies are not a common metric used in research on college readiness. Instead, registration and success in gateway courses, retention, persistence to completion or transfer, and time-to-graduation for students taking college readiness support courses are more common metrics. When the question is examined, evidence suggests that supports are effective, at least for those students who go on to register in college-level courses. Bahr (2008) finds no difference in credential attainment between successful completers of math DE sequences and students directly enrolling in college-level math within a population of Californian community college students; Wheeler and Bray (2017) find no difference with regard to college-level math course success between DE and non-DE students in an Alabama two-year program.
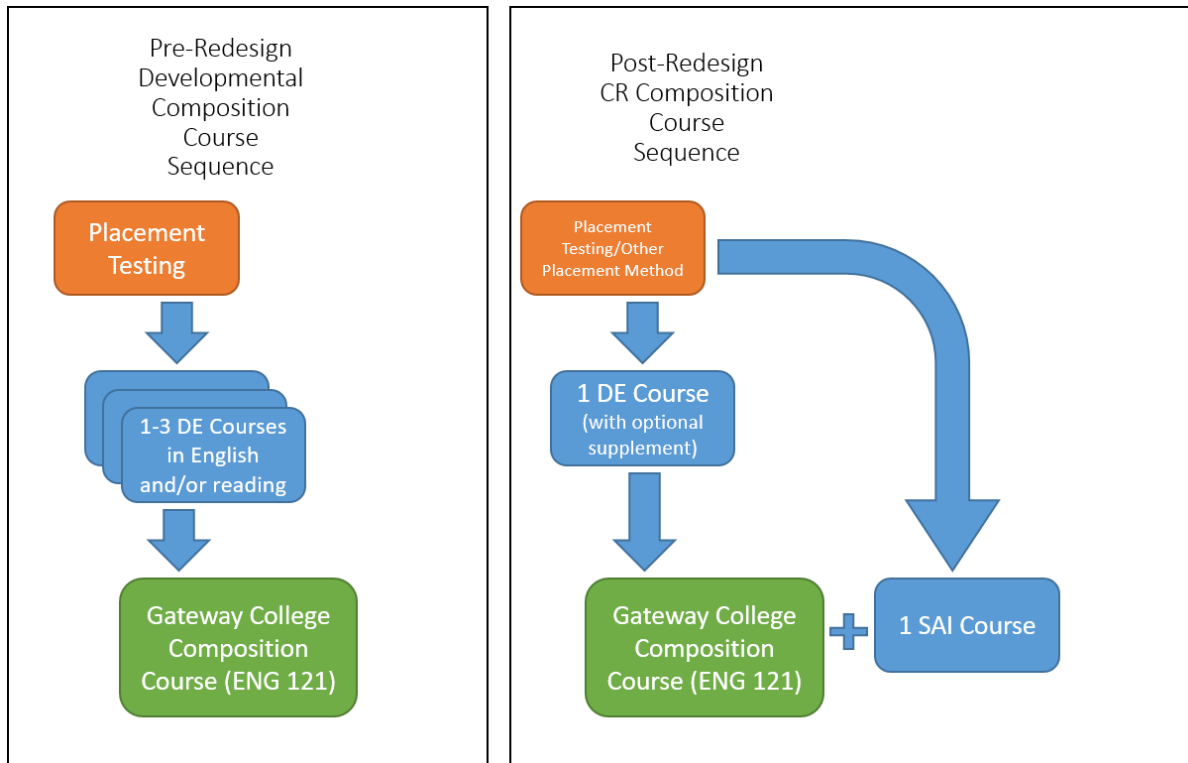
DE and SAI at CCCS, 2008-2018

This chapter summarizes the college readiness support courses and major course sequences offered at CCCS over the last 10 academic years.
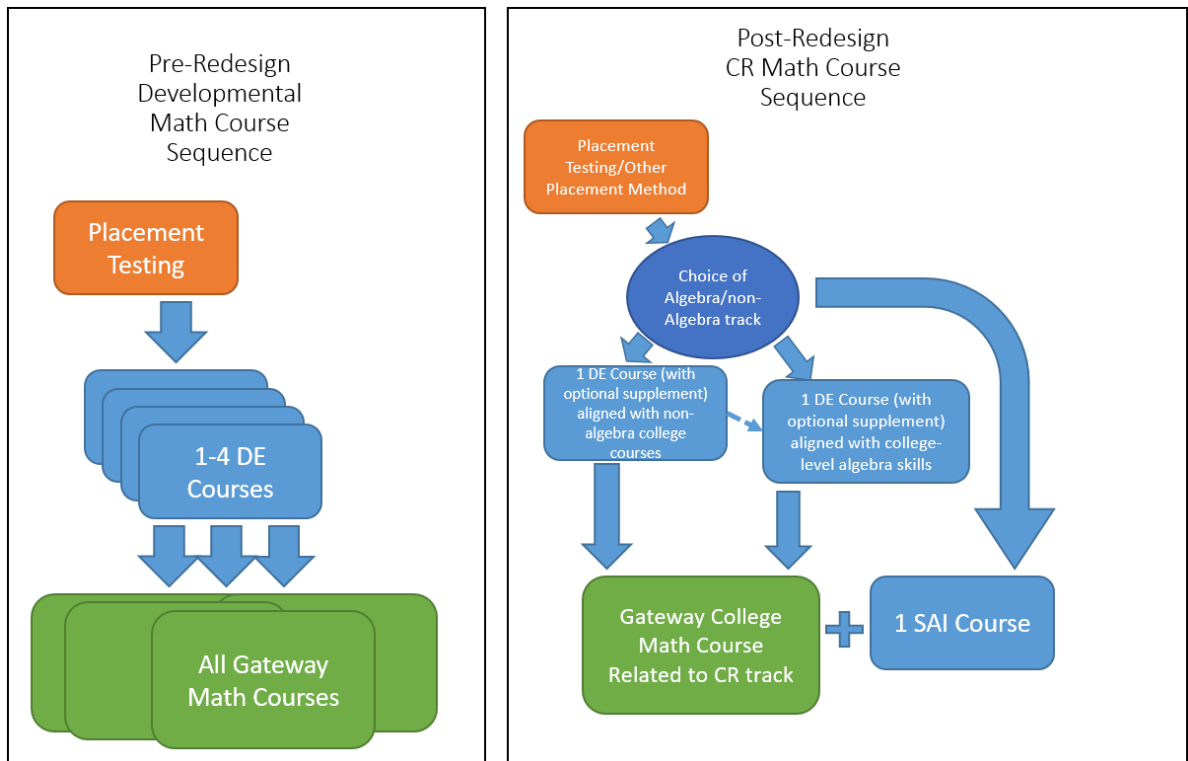
The Evolution of DE and SAI Sequences at CCCS

Over the last decade, college readiness support course offerings at CCCS have shifted substantially. While individual colleges have piloted and maintained several unique sequences, the standard set of course offerings prior to the 2013-2014 for both math and English support courses was a set of three or four DE courses, taken in sequence. The lowest level course had an 030 course number, followed by an 060 course, an 090 course, and, in the case of math students intending to take college-level algebra, an 099 course (this course replaced an earlier pre-algebra course -- MAT 106 -- at some colleges in 2009). If a new student scored close to college level on the placement exams, that student would begin the sequence at a higher-level course, an 090 course rather than an 060, for example.

In 2014, CCCS began to implement a redesign process that shortened the DE sequence, merged the developmental reading and writing tracks into a single composition and reading sequence, and included SAI courses as well as DE courses. Additionally, CR math courses were redesigned to offer separate support tracks depending on whether a student planned to register for algebra or non-algebra course, with an additional option of moving from the non-algebra track to the DE algebra track. In the post-redesign framework, most students take either a developmental education (DE) course or a supplemental academic course (SAI); a minority of students take both DE and SAI courses. The figures below show a general summary of the changes.

Figure 1: Pre-and Post-Redesign CR Composition Sequences

Pre-Redesign Developmental Composition Course Sequence

Placement Testing → 1-3 DE Courses in English and/or reading → Gateway College Composition Course (ENG 121)

Post-Redesign CR Composition Course Sequence

Placement Testing/Other Placement Method → 1 DE Course (with optional supplement) → Gateway College Composition Course (ENG 121) + 1 SAI Course

Figure 2: Pre-and Post-Redesign CR Math Sequences

Pre-Redesign Developmental Math Course Sequence

Placement Testing → 1-4 DE Courses → All Gateway Math Courses

Post-Redesign CR Math Course Sequence

Placement Testing/Other Placement Method → Choice of Algebra/non-Algebra track → 1 DE Course (with optional supplement) aligned with non-algebra college courses / 1 DE Course (with optional supplement) aligned with college-level algebra skills → Gateway College Math Course Related to CR track + 1 SAI Course

Placement in DE Courses

The CCCS colleges follow the guidelines of the Board Policy for Basic Skills Instruction (BP9-41). This policy requires that students who wish to enroll in credit math or English courses or who declare that they are a degree seeking student be "assessed in mathematics, writing, and/or reading." While assessment is mandatory, placement is advisory. The policy requires that students who do not demonstrate college readiness be "advised to enroll in remedial skills classes during the first semester." That means that students whose scores would place them in a developmental course may choose to take the college level course. Colleges do not encourage students to take college level courses unless they have demonstrated college readiness with one of the Colorado Commission of Higher Education college readiness indicators defined in the "Developmental Education" policy or by achieving one of the benchmarks defined by CCCS or one its member colleges. Instead, CCCS colleges offer a recommended developmental course placement as the best pathway for success of the student depending on the degree path and educational goals.

Waiving Developmental Coursework and Voluntarily Enrolling in Developmental Coursework

Recently, colleges have changed their processes for handling students with developmental course recommendations who decide to ignore the advice of CCCS college professionals. Before the Developmental Education Redesign in 2014, few, if any, students asked to waive a developmental requirement. Conversations at developmental design meetings clarified for faculty and staff that under Board Policy, the placement recommendation was advisory. Colleges began adapting their processes to allow students who had a developmental course placement but who chose not to take the developmental course to enroll in a college level course. As of April 2019, each college has its own process for waiving the developmental education requirement. Some colleges simply allow students to request an override of the course prerequisite; other colleges have a proscribed and detailed process for waiving developmental education recommendations. Colleges that require students to sign waivers usually include language that declares a student had received advice to take a developmental course but was choosing, instead, to take the college level course. This language indicated that the student understood that he/she did not have the skills to be successful in the course. For example one waiver states that the student "released" the college and all its employees, CCCS, and the state of Colorado, "from any liability for my decision to opt out of the prescribed" developmental course requirement. The student also must acknowledge that an "academic advisor has fully informed me of the risks involved in not taking the recommended course(s), which may include delayed completion of my academic program and/or poor performance in courses that have pre-requisite or co-requisite course which I did not complete with a "C" or above." The student would then "take full responsibility for this decision." The student and two college employees, an advisor and the advising director, then signed the waiver. This waiver was then added to either Space Mountain or Campus Files. At other colleges, a student can waive a developmental course recommendation by saying that he/she wants to enroll in the college level course. Some of the colleges internally track those students placed into developmental course work who have chosen to take a college level course. However, there is no comprehensive method of tracking DE course waivers at the system level.

Students who place into a college level course may also decide to enroll in a developmental course. College faculty and staff reported to system office staff that many students choose to take a developmental course because they believe that they are not ready for the college level course. Often

these students are older students, people who are coming to college after being in military service or working for many years. These students are not asked to sign a waiver but are advised that they are taking a course that they are not required to take and that will add both time and money to their academic progress.

DE and SAI Offerings at CCCS

College readiness offerings at CCCS colleges have changed substantially over the years. The table, "Count of CCCS Colleges Offering DE and SAI Courses by Academic Year" shows a count of CCCS colleges offering various DE and SAI courses over the past ten academic years.

Beginning in the 2013-2014 academic year, the system began a transition toward a model that included both DE courses and SAI courses rather than only DE courses. Additionally, the model shifted from a DE system that could take multiple semesters to complete to a single-semester DE model that included co-requisite instruction for students with low ability evidence. The courses within this model are described below. Some colleges also offer alternative courses oriented toward meeting college-level course prerequisites. These vary between colleges and have been grouped under "Other DE/SAI Courses" in most charts contained in the present report due to course variety and low enrollments. Most of these courses are all DE (prerequisite) courses. However, several additional SAI courses are in development. Notably, while all colleges currently see registration in both DE and SAI college readiness support courses for College Composition and Reading, not all colleges had active SAI math offerings in 2017-18.

CCR (College Composition and Reading) Courses

- CCR 091 is a supplemental lab for students with very low reading or writing placement scores who are also registered for CCR 092.
- CCR 092 provides an introduction to college-level reading and writing. Students with low reading or writing placement scores take CCR 092 as a prerequisite for English 121 (college-level English composition).
- CCR 093 is a supplemental academic instruction course offered as a co-requisite to college-level courses outside of the English curriculum, such as Psychology 101, for students with reading or writing placement scores below college-level.
- CCR 094 is a supplemental academic instruction course offered as a co-requisite to English 121 for students with reading or writing placement scores below college-level and is sometimes used by CCR 092 completers seeking additional academic support in their college English course.

Math Courses

- MAT 020 is a supplemental lab for students with very low math scores who are also registered for MAT 050.
- MAT 050 is a prerequisite to non-algebra-track college-level Math courses (e.g., MAT 103, 107, 108, 109, 120, or 135) for students with low math placement scores. While not designed as a pathway to college algebra, many students with low placement scores still begin the developmental math sequence with MAT 050, then register for MAT 055 prior to registering for college-level algebra course.
- MAT 025 is a supplemental lab for MAT 055 (a DE course described below).
- MAT 055 is a prerequisite for MAT 121 (College Algebra) for students with low math placement scores.

- MAT 091 is a supplemental academic instruction course offered as a co-requisite to applied math courses such as MAT 107 (Career Math) for students with math placement scores slightly below the college level. MAT 050 completers seeking additional academic support with their college math course are also observed to enroll in this course.
- MAT 092 is a supplemental academic instruction course offered as a co-requisite to college-level math courses such as MAT 120 (Math for Liberal Arts) and MAT 135 (Intro to Statistics) for students with placement scores slightly below the college level.
- MAT 093 is a supplemental academic instruction course offered as a co-requisite to MAT 121 (College Algebra) for students with math placement scores slightly below the college level. MAT 055 completers seeking additional academic support with their algebra course are also observed to enroll in this course.

Table 1: Count of CCCS Colleges Offering Specific CR Courses by Academic Year

	2008-2009	2009-2010	2010-2011	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018
ENG030	12	12	11	10	5	2				
ENG060	13	13	13	13	12	10				
ENG090	13	13	13	13	13	12	2			
REA030	12	11	11	10	5	2				
REA060	13	13	13	13	12	8	1			
REA090	13	13	13	13	13	12	2			
CCR091						7	7	7	6	5
CCR092						13	13	13	13	13
CCR093						6	5	3	2	2
CCR094						13	13	13	13	13
Other DE/SAI Language Skills Courses				1	7	4	1			
MAT020									3	4
MAT025						8	12	11	11	11
MAT030	13	13	13	13	12	10				
MAT050						10	13	13	13	13
MAT055						11	13	13	13	13
MAT060	13	13	13	13	13	13	2			
MAT090	13	13	13	13	13	13	3			
MAT091						5	5	5	5	5
MAT092						4	3	4	5	6
MAT093						5	4	6	8	7
Other DE/SAI Math Courses	13	13	13	13	13	13	9	3	3	4

SAI courses have been highlighted in light orange.

Additional Variation between College CR Approaches

Reports from administrators and faculty to CCCS staff emphasize the unique challenges faced at the different colleges and highlight a variety of approaches to placement and student support that cannot be examined at the system level. Challenges include large populations of English language learners at some large urban campuses and limited availability of faculty at some smaller rural colleges. Implementation of placement and presentation also varies: some colleges require co-requisite enrollment in study skills courses in addition to SAI courses; several colleges offer additional "boot camp" style summer programs for new students; one college is piloting a "fall-back" option for students who find a need for more practice after registering for a college level course with supplemental instruction.

Such variety and innovation of course offerings and approaches to College Readiness Support provide many opportunities for future research. Subsequent CCCS Support for College Readiness reports may, for example, explore strategies to help CCCS and its colleges to determine
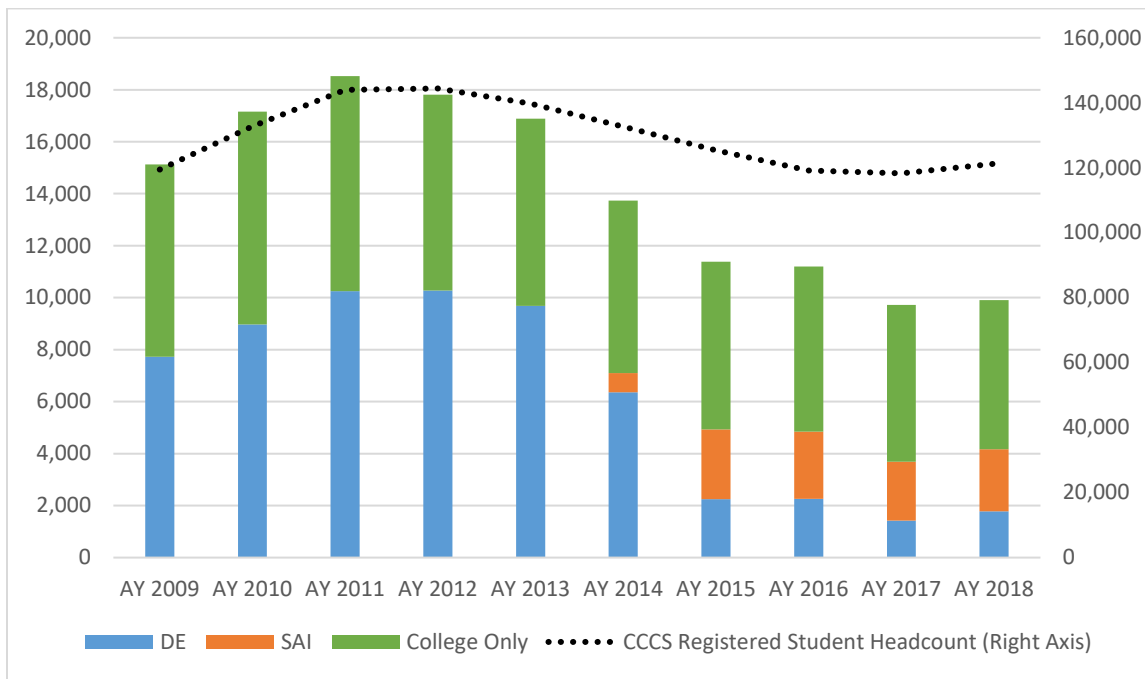
- for which students does SAI course enrollment offer the best chance of success and for which students does DE course enrollment offer the best chance of success;
- for those students who assess at the lowest levels—in the category that might be considered Adult Basic Education—what programs and course offerings best meet their needs;
- does enrollment in AAA courses (and other college prep courses) affect overall student success; and
- what tutorial services –basic tutoring, aides in the classrooms, computer adaptive modules/programs, etc,, seem the most helpful to students.

Trends in College Readiness Course Outcomes, 2008-2018

The following charts show several trends in college readiness course outcomes over ten academic years. These charts use the new and transfer student cohorts described in the following chapters -- rather than the full-year College Readiness counts; actual-year-to-year registration counts will diverge somewhat from these figures. Since earlier DE cohort outcomes use a three-year window for evaluating success at the college level, the 2016-2017 and 2018-2019 cohorts-- which use a one-year window -- are classified as separate cohorts. CCCS Registered student headcounts were estimated using counts derived from the CCCS operational data store and may not match counts reported in other reports.

**Figure 3: College Readiness English/Reading CCR New/Transfer Student Cohort Sizes 2008-2018**

*Academic Years 2017 and 2018 only include registrations within that academic year.

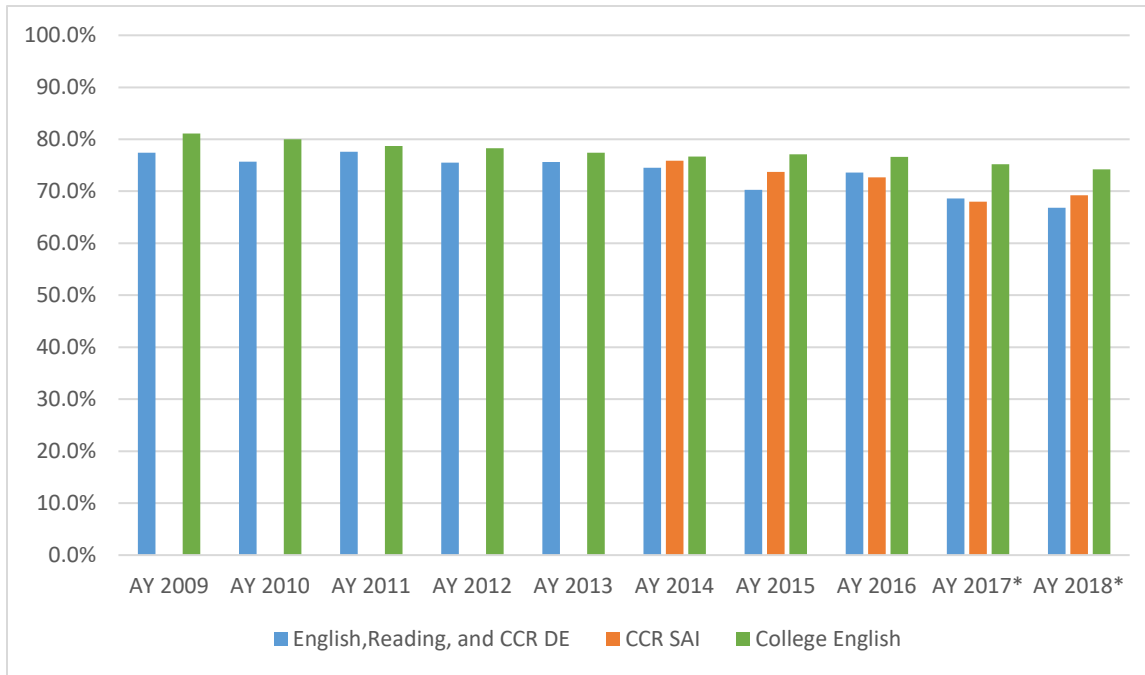*Academic Years 2017 and 2018 only include registrations within that academic year.

The relative size of the analysis cohorts roughly correlates with overall trends in CCCS headcounts, with population sizes peaking in the 2010-2011 academic year and declining as economic conditions in the state improved over the next several years. Initial pilots of SAI courses began in the 2013-2014 academic year and have increased as a proportion of college readiness registrations. Because enrollment in DE courses adds time to the academic plan and increases the out of pocket costs for students, CCCS and its colleges are working to continue this trend of increasing the enrollments in SAI courses.

Figure 4: English 121 Success rates for DE Cohorts 2008-2018
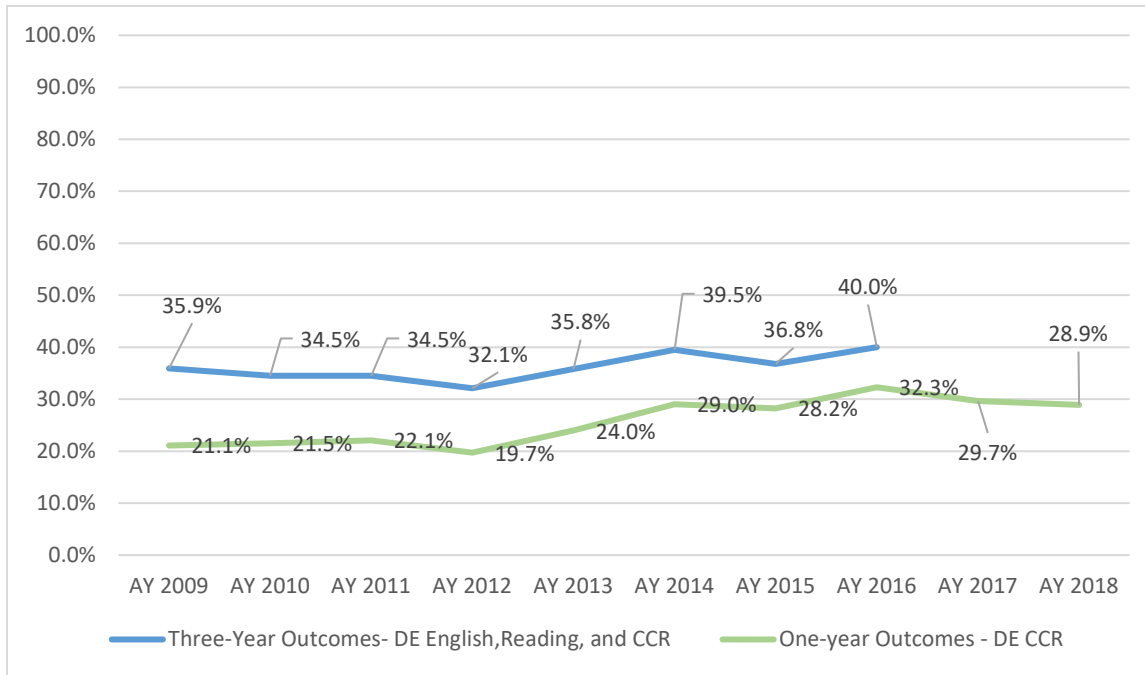
This chart only examines the college-level course success of the DE analysis cohorts: In order to be counted in this figure, students must have successfully finished their DE course or course sequence *and* ENG 121 (College Composition) within the analysis window. Evidence for the effectiveness of a shortened DE sequence compared to earlier (pre-2014) models is mixed. However, the one-year trend following the redesign is slightly positive. The narrowing gap between one and three-year rates seen following 2012 also suggests that the shortened DE sequence may be having the intended effect of accelerating students to college level courses.

Figure 5: Success Rates of Cohorts within College-Level English 121 Coursework 2008-2018
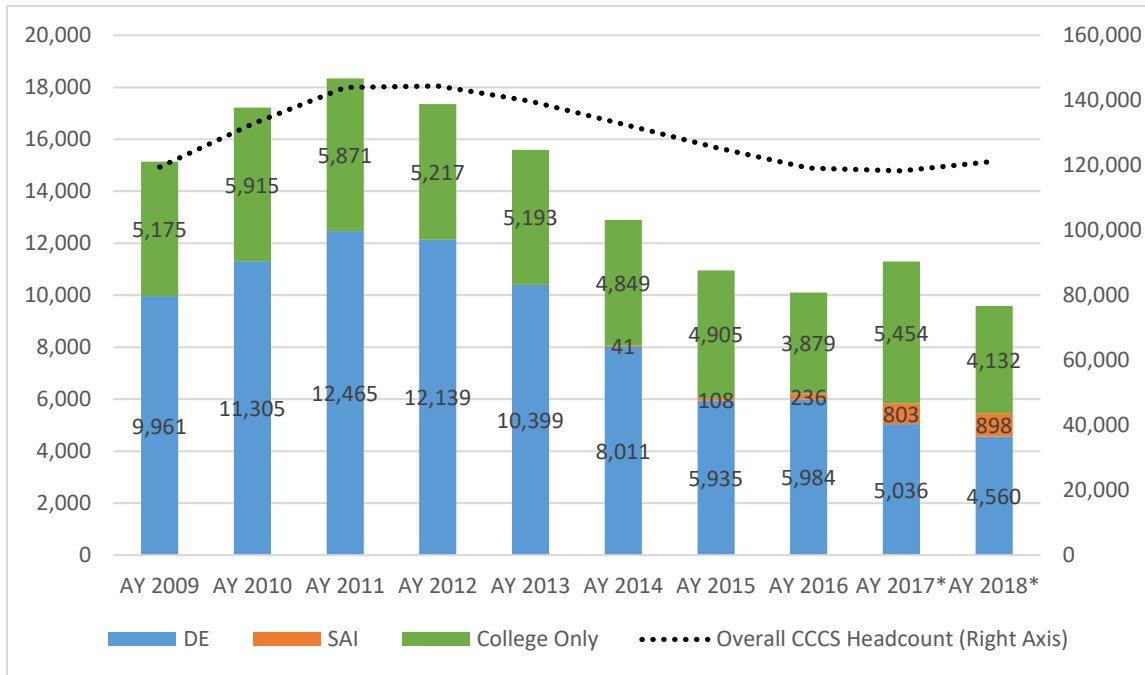

*Academic Years 2017 and 2018 only include registrations within that academic year. Students retaking failed courses in later semesters lead to higher three-year success rates compared to one-year rates.

This chart shows the success rates of the three new/transfer analysis cohorts *within* English 121. In other words, it compares the success rates of DE and SAI students (earning a C or higher) who have registered in English 121 with students registering for English 121 without college readiness support. Success rates for students taking college readiness support courses (either as prerequisite DE or as co-requisite SAI courses) are lower than students showing evidence of college readiness.

Figure 5 demonstrates that since 2014 both DE and SAI courses prepare CCCS students for success in the college gateway course in English. What the analysis does not clarify is the number of students enrolled in the DE course that do not within the time frames of the cohort enroll in the college level gateway course. For the 2017-2018 cohort, 1,778 students in CCCS colleges enrolled in a DE English/reading course. Only 802 (45%) of those students enrolled in the college level gateway course. That means that 976 students (55%) of the original DE cohort for English/reading did not enroll in the college gateway course. A research question for future reports could be determining what happens to these students.

The success rates reported here include students withdrawing after the drop deadline in their denominator; reports showing only the success ratios for course completers will have higher ratios.

**Figure 6: College Readiness Math New/Transfer Student Cohort Sizes 2008-2018**

*Academic Years 2017 and 2018 only include registrations within that academic year.

The relative size of the analysis cohorts roughly correlates with overall trends in CCCS headcounts, with population sizes peaking in the 2010-2011 academic year, and declining as economic conditions in the state improved over the next several years. Initial pilots of SAI courses began in the 2013-2014 academic year and have increased as a proportion of college readiness registrations. However, most students receiving support in math still begin in a DE sequence. Enrollment in DE courses adds time to the academic plan and increases the out of pocket costs for students. CCCS data also shows that many students who enroll in a DE course, even those who successfully complete that DE course, do not enroll in the college level course. CCCS and its colleges are working to determine which students needing College Readiness Support could be successful in an SAI course so that the numbers of students enrolled in SAI courses will increase and enrollment in DE courses will decrease.

Figure 7: Gateway Math Course Success for DE Cohorts 2008-2018
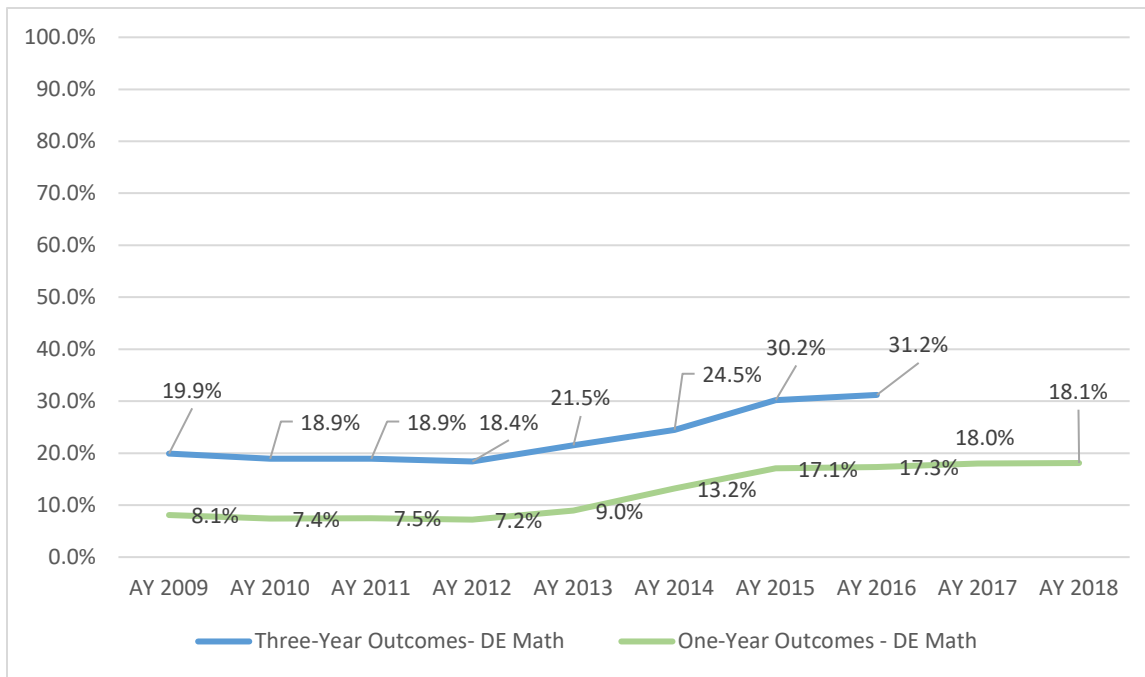
The above chart only examines the college-level course success of the DE analysis cohorts: In order to be counted in this figure, students must have successfully finished their DE course or course sequence *and* a college-level math course within the analysis window. Evidence for the effectiveness of a shortened DE sequence compared to earlier (pre-2014) models is mixed; there is a marked increase in three-year college-level success following the 2014 redesign, but one-year success rates in recent years remain low. Nevertheless, the more recent one-year figures are noticeably better than one-year completion rates prior to the redesign.

Figure 8: Success Rates of Cohorts within College-Level Math Gateway Coursework 2008-2018
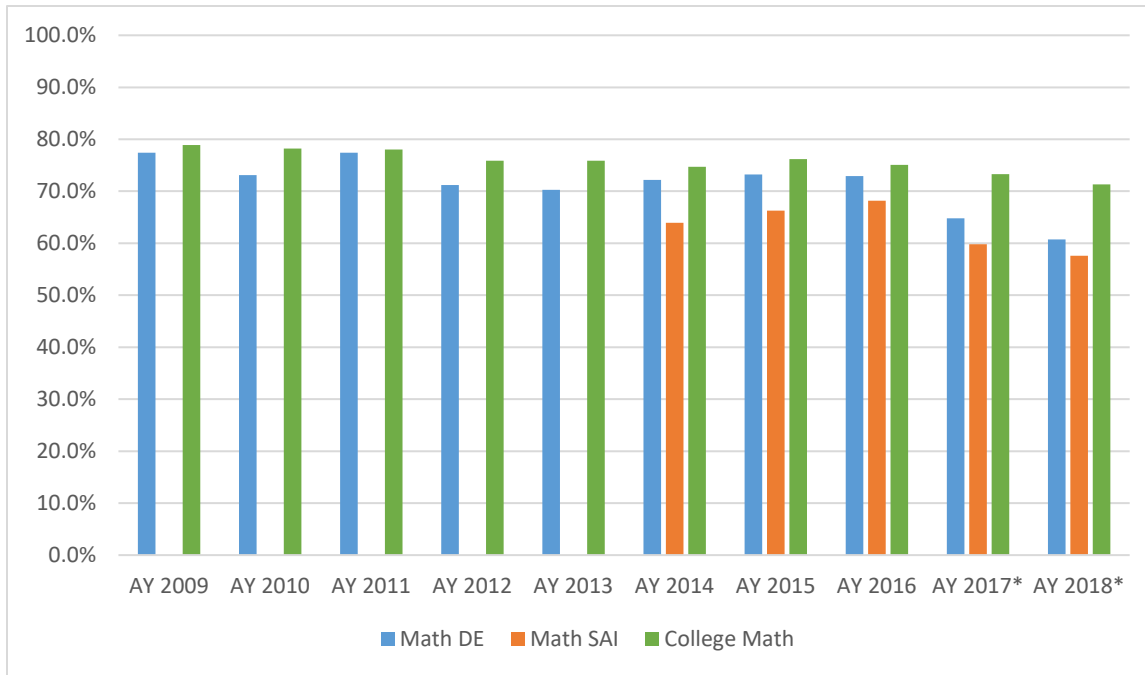
*Academic Years 2017 and 2018 only include registrations within that academic year. Students retaking failed courses in later semesters lead to higher three-year success rates compared to one-year rates.

This chart shows the success rates of the three new/transfer analysis cohorts *within* college-level math courses. In other words, it compares the success rates of DE and SAI students (earning a C or higher) who have registered in college-level math with students registering for math courses without college readiness support. Gaps in success rates between college-level DE, and SAI cohorts are present. It should be reiterated that low numbers of students directly registering for SAI math courses, along with between-program variability with regard to placement practices and student ability likely contribute to the pattern of lower within-course success rates seen in the SAI cohorts. However, the persistent low relative success rates within SAI cohorts seen in the system aggregates are somewhat concerning.

Figure 8 demonstrates the same trend found in the English/reading CR cohort. In all CCCS colleges, 4,560 students were enrolled in a DE math course in 2017-2018. Of those, only 1,440 (32%) enrolled in a college level gateway math course. That means 3,120 students (68%) of the original DE cohort for math did not enroll in a college gateway math course. A research question for future reports could be determining what happens to these students.

The success rates reported here include students withdrawing after the drop deadline in their denominator; reports showing only the success ratios for course completers will have higher ratios.

Year-by-Year Analysis of DE and SAI at CCCS

CCCS has compiled data analysis of students in DE and SAI courses for each year going back to 2009. Each of these reports disaggregates the data by demographics. These year by year reports have been distributed to college leadership at each of the colleges and have been part of discussions and planning for CCCS College Presidents and for the Vice Presidents of both Instruction and Student Services. CCCS is planning a state-wide event for math and English faculty to explore the report and to present innovations that are happening at each of our thirteen colleges. These reports will help the system and our individual colleges determine what future college readiness reports should include. A sample of the data from the 2017-18 report available to CCCS and its colleges is shown in Appendix 1.

In addition, CCCS has developed individual college reports for both math and English/reading that disaggregate the data for each college by demographics, including race and ethnicity, gender, age, and Pell Eligibility. These college by college reports have been provided to the leadership teams at each college. System staff will work with each college to determine the best way of presenting that data and what other questions that the colleges have.

In addition to being available to all CCCS colleges, the year by year reports and the college by college reports are available upon request

Conclusion

Trends Identified in the Present Report

Emergence of Supplemental Academic Instruction

Nationally, and within CCCS, a major trend in support for college readiness is the implementation of supplemental academic instruction (SAI) programs in addition to or as a replacement for more traditional developmental education supports. Of those not yet at a college level in English, the majority of new and transfer students entering CCCS colleges are now placed in SAI courses when they register for college-level English coursework. These students see success at the college level at a rate only slightly lower than those students judged college-ready.

Adoption of SAI in math support sequences has been slower, with less consistent results. Most students not yet college-ready in mathematics courses are still placed in DE coursework. Comparison of outcomes at the college level between DE completers and SAI registrants show highly variable outcomes between college programs.

Faster Advancement to the College Level

The curriculum redesign in 2013-2014 implemented two major changes to CR offerings at CCCS: a streamlined DE sequence and an option for supplemental instruction. Following the redesign, a higher percentage of new and transfer students entering the DE sequence advanced to success in a college-level gateway course, while students assessed as being closer to the college level were offered the option to take a co-requisite course rather than a prerequisite course. These changes appear to have had the intended effect of speeding advancement to the college level, although questions remain regarding whether the redesign denies students with severe knowledge gaps sufficient opportunity to advance.

Recurring Reports

This report only addresses a small number of factors related to CCCS college readiness activities. Similarly, any recurring reports will only be able to track a limited number of outcomes and indicators, with a limited level of specificity. However, ongoing monitoring of system- and college-level outcomes will be useful for identifying high-level trends and areas for further improvement. It is recommended that Academic and Student Affairs work with the Institutional Research and Business Intelligence department to identify key outcome metrics and define the time scope of recurring reports.

Key considerations include:

- What outcomes need to be reported on a regular basis?
- How many years should cohorts be tracked?
- Are cohorts comprised of summer or fall new and transfer students sufficiently representative of the CCCS CR population?

Retention, Attrition, and Persistence Outcomes in Future Reporting and Research

While a comparison of retention and persistence across 20 different cohorts including both full- and part-time students was beyond the scope of this (and previous) reports, ongoing analysis of these metrics will be useful. Recurring reports providing updates on the performance of more than one cohort could reasonably show fall-to-fall retention rates for the previous years' cohorts, as well as three- or five-year graduation rates for earlier cohorts. Inclusion of transfer outcomes will depend on the integration of National Student Clearinghouse data into CCCS data systems and workflows.

Areas for Further Study

The Colorado Community College System colleges (and the wider education research community) have a need for deeper understanding of the following topics related to college readiness. These topics do not need to be covered in ongoing reporting, but by better understanding these aspects of college readiness, CCCS will be able to improve its existing college readiness support services while having a better foundation on which to design new approaches.

Addressing these areas of study may be beyond the current capacity of the CCCS institutional research department; they are detailed in this report in order to highlight areas which need to be better understood.

Placement Practices

Over the last 10 years, CCCS colleges have used a number of assessment instruments and alternative methods to establish evidence of college readiness. A rigorous comparison of placement practices and college-level outcomes will offer insight into not only the validity of the placement methods but also into the relationship between college readiness indicators and the college curriculum.

In fact, several system colleges are currently collaborating on a controlled trial comparing self-assessment using multiple measures to a standardized exam. Additional questions related to placement practices include:

- Are different student populations more or less likely to provide a given type of college-readiness evidence?

- To what extent do the skills assessed by various placement methods correspond with CCCS curriculum?

Skill Attainment and Student Learning

The theory underlying all types of college-readiness coursework is that students' skill levels are not purely a function of their initial ability but that additional instruction, guided practice, etc. can help adult learners to learn and retain new knowledge. In the abstract, this theory of learning is obviously sound. However, investigation into the efficacy of specific course designs in promoting student learning is often limited to examination of course grades and pass rates. Focused qualitative and quantitative evaluation of student learning in a CR context could lead to more effective curriculum design and might even reveal possibilities beyond the DE/SAI paradigms.

Retention, Persistence, and Time-to-Degree

HB19-1206, a bill passed by the Colorado General Assembly in the 2019 regular session, mandates that direct enrollment in "stand-alone developmental education courses that may extend the student's time to degree" will be reduced to 10 percent of total institutional enrollment by 2022. While "directly" is not defined in the bill text, the implication of the bill's language is that colleges authorized to offer developmental education courses must reduce enrollment in these courses if there is reason to believe that this will increase student time-to-degree. CCCS should examine the interaction between factors such as time-status, course of study, and indicators of college readiness with developmental education registration so that a better estimate of whether the risk of delay of degree for a given student is greater than the risk of delay due to failure at the college level. This will place the System and its colleges on a more secure footing when discussing college readiness policy with state agencies.

Efficacy of CR Supports for Different Sub-Populations

Achievement of equity in terms of access and outcomes for under-represented populations is a high-priority objective of the CCCS Strategic Plan. As can be seen in Appendix 1 in this report, students of color register in developmental and supplemental coursework at a higher rate than the general student population, while also succeeding in gateway courses at a lower rate. However, these gaps are not persistent over time: a wide range of gaps are reported between years. This variability would likely increase if intersections such as race and gender or race and academic program are considered.

Further investigation of equity in CR outcomes, as well as the role of CR courses in achieving equity goals is merited. A specific question might be:

- What factors drive disparities in minority CR over-representation?

Data also indicates that students of color, particularly Black/African American and Hispanic students, have a significantly lower success rate in the college level gateway courses than their white peers (See Appendix 1). This trend holds both for students who first complete either a DE or SAI course as well as students who place directly into the college level gateway course. CCCS has prioritized "assuring equity in outcomes for students from underrepresented groups" (Colorado Community College System Strategic Plan: 2015-2025). CCCS should also explore what factors drive the disparity in successful completion of college level gateway courses by students of color.

These questions could be approached in several ways, including interviews with students, comparison of placement methods for minority versus non-minority students, and analysis of college readiness

indicators (are minority students' scores/evidence of readiness lower than others?). Due to the wide range of geographic populations served by CCCS colleges, a site-specific approach may yield more actionable data than a system-level survey.

Variation between Colleges and Programs

The Colorado Community College System covers a wide variety of colleges, programs, and student populations. This makes interpretation of system-level reporting difficult. Understanding the degree to which trends and outcomes vary between programs and colleges could aid interpretation, not just for CR activities, but for all system-level reporting. Collection and dissemination of qualitative information about different approaches between colleges will also aid in identification of effective practices.

Student and Faculty Experiences

In preparation for this report, some background information about DE policy at the college level was collected from program administrators. CCCS also collected stories from faculty describing the redesign process; these essays can be found at: https://www.cccs.edu/wp-content/uploads/documents/VoicesonEducationRedesign_Publication.pdf Student voices, unfortunately, are still largely absent from the college readiness conversation. An ongoing effort to solicit feedback from both students and faculty involved with college readiness activity could make system policy more responsive to lived experiences and, if published, could expand collective understanding of the CR process.

Looking Forward: Challenges and Opportunities in College Readiness Support at CCCS

This report contains a large amount of information about college readiness activities at CCCS colleges. General trends were identified showing increased use of SAI and higher rates of student advancement to the college level in recent years. However, gaps remain in the relative performance of students taking college support courses compared to students with evidence of college-readiness.

This report is limited in that it does not examine several key long-term outcomes such as fall-to-fall retention, credential attainment and upward transfer among CR students. These outcome metrics must be incorporated into future reports, with the understanding that some additional cohort selection criteria (such as time status) may need to be added in order to produce reliable results. Certain student-level factors such as time status and intersections between demographics and initial course registrations were also not included in this report in order to save space. As noted above, there are many directions for further, focused research related to support for student college readiness.

In addition to continued examination of broad system-level trends, focused evaluations of individual college readiness programs that incorporate student and faculty perspectives will be helpful in identifying effective college readiness strategies. The System is well-positioned to facilitate sharing of data between programs so that the Colorado Community Colleges may work together to better serve their students.

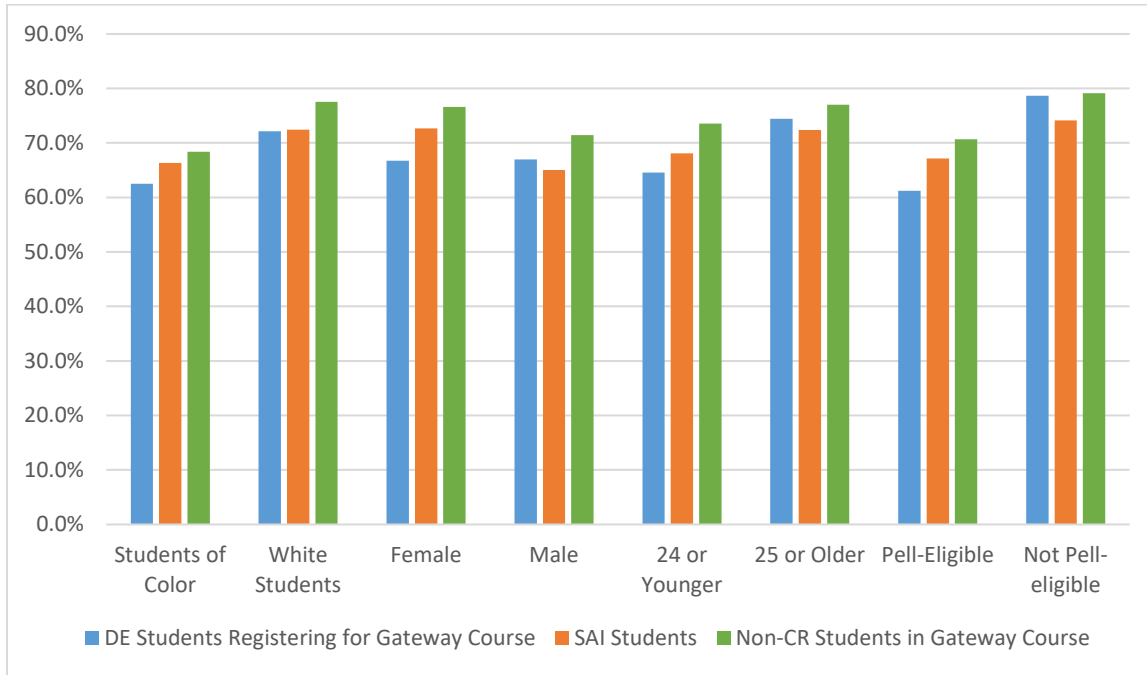**Table 2. Student Demographics: CR Course Registrants Compared to All Registered Students**

	Students Registering For CR Coursework This Academic Year	Percentage of Total	All Registered Students	Percentage of Total
Race				
American Indian or Alaskan Native	176	0.9%	938	0.8%
Asian	584	3.0%	3,767	3.1%
Black or African American	1,819	9.4%	6,800	5.6%
Hispanic	6,026	31.3%	26,337	21.7%
Multiple Races	811	4.2%	4,638	3.8%
Native Hawaiian and Other Pacific Islander	64	0.3%	334	0.3%
Non-Resident Alien (International)	649	3.4%	2,987	2.5%
Unknown	983	5.1%	10,227	8.4%
White	8,162	42.3%	65,204	53.8%
Gender				
Female	10,683	55.4%	66,517	54.9%
Male	8,591	44.6%	54,715	45.1%
Age Category				
24 or Younger	13,101	68.0%	75,448	62.2%
25 or Older	6,173	32.0%	45,773	37.8%
No Age Data	0	0.0%	11	0.0%
Pell Eligibility				
Pell-Eligible	9,245	48.0%	34,532	28.5%
Not Pell-Eligible	3,339	17.3%	18,018	14.9%
No Pell Eligibility Information	6,690	34.7%	68,682	56.7%
Total	**19,274**		**121,232**	

Table 3. English Cohort Gateway Course Registration and Success within One Academic Year by Key Demographics

	Initial DE Cohort	DE Registering for Gateway Course	DE Passing Gateway Course	DE Overall Success Rate	DE Gateway Course Success Rate	SAI Registered for Gateway Course	SAI Passing Gateway Course	SAI Gateway Course Success Rate	Non-CR Registered For Gateway Course	Non-CR Passing Gateway Course	Non-CR Gateway Course Success Rate
Race											
American Indian /Alaskan Native	19	9	6	31.6%	66.7%	23	14	60.9%	41	26	63.4%
Asian	100	53	40	40.0%	75.5%	64	49	76.6%	141	105	74.5%
Black or African American	215	81	51	23.7%	63.0%	224	135	60.3%	277	162	58.5%
Hispanic	621	285	173	27.9%	60.7%	830	563	67.8%	1449	1003	69.2%
Multiple races	67	31	16	23.9%	51.6%	102	62	60.8%	256	185	72.3%
Hawaiian/Pacific Islander	13	5	4	30.8%	80.0%	7	6	85.7%	14	9	64.3%
Non-Resident Alien	80	43	33	41.3%	76.7%	82	57	69.5%	152	114	75.0%
Unknown	47	22	16	34.0%	72.7%	72	54	75.0%	215	179	83.3%
White	616	273	197	32.0%	72.2%	987	715	72.4%	3196	2478	77.5%
Gender											
Female	944	448	299	31.7%	66.7%	1304	948	72.7%	3067	2350	76.6%
Male	834	354	237	28.4%	66.9%	1087	707	65.0%	2674	1911	71.5%
Age Category											
24 or Younger	1,320	618	399	30.2%	64.6%	1754	1194	68.1%	4646	3418	73.6%
25 or Older	458	184	137	29.9%	74.5%	637	461	72.4%	1095	843	77.0%
Pell Eligibility											
Pell-Eligible	1,121	508	311	27.7%	61.2%	1439	966	67.1%	2501	1768	70.7%
Not Pell-Eligible	327	164	129	39.4%	78.7%	476	353	74.2%	1699	1344	79.1%
No Pell Eligibility Information	330	130	96	29.1%	73.8%	476	336	70.6%	1541	1149	74.6%
Total	**1,778**	**802**	**536**	**30.1%**	**66.8%**	**2391**	**1655**	**69.2%**	**5741**	**4261**	**74.2%**

Chart 1: Success in Gateway English 121 Courses by Key Demographics

Legend: ■ DE Students Registering for Gateway Course ■ SAI Students ■ Non-CR Students in Gateway Course

Table 4. Math Cohort Gateway Course Registration and Success within One Academic Year by Key Demographics

	Initial DE Cohort	DE Registering for Gateway Course	DE Passing Gateway Course	DE Overall Success Rate	DE Gateway Course Success Rate	SAI Registered for Gateway Course	SAI Passing Gateway Course	SAI Gateway Course Success Rate	Non-CR Registered For Gateway Course	Non-CR Passing Gateway Course	Non-CR Gateway Course Success Rate
Race											
American Indian or Alaskan Native	43	15	9	20.9%	60.0%	4	1	25.0%	19	12	63.2%
Asian	99	33	22	22.2%	66.7%	42	31	73.8%	135	99	73.3%
Black or African American	347	76	39	11.2%	51.3%	122	60	49.2%	187	125	66.8%
Hispanic	1,353	410	224	16.6%	54.6%	318	168	52.8%	823	558	67.8%
Multiple races	195	57	33	16.9%	57.9%	31	20	64.5%	185	130	70.3%
Native Hawaiian/Pacific Islander	20	5	1	5.0%	20.0%	3	1	33.3%	13	6	46.2%
Non-Resident Alien	112	35	22	19.6%	62.9%	45	28	62.2%	140	102	72.9%
Unknown	145	49	34	23.4%	69.4%	14	10	71.4%	163	125	76.7%
White	2,246	760	490	21.8%	64.5%	287	180	62.7%	2467	1791	72.6%
Gender											
Female	2,446	802	510	20.9%	63.6%	488	306	62.7%	2255	1689	74.9%
Male	2,114	638	364	17.2%	57.1%	378	193	51.1%	1877	1259	67.1%
Age Category											
24 or Younger	3,257	1,017	588	18.1%	57.8%	746	406	54.4%	3120	2175	69.7%
25 or Older	1,303	423	286	21.9%	67.6%	120	93	77.5%	1012	773	76.4%
Pell Eligibility											
Pell-Eligible	2,514	749	429	17.1%	57.3%	488	278	57.0%	1530	1052	68.8%
Not Pell-Eligible	1,061	394	254	23.9%	64.5%	212	130	61.3%	1116	838	75.1%
No Pell Eligibility Information	985	297	191	19.4%	64.3%	166	91	54.8%	1486	1058	71.2%
Total	**4,560**	**1,440**	**874**	**19.2%**	**60.7%**	**866**	**499**	**57.6%**	**4132**	**2948**	**71.3%**

Chart 2: **Success in Gateway Math Courses by Key Demographics**

Legend: DE Students Registering for Gateway Course (blue), SAI Students (orange), Non-CR Students in Gateway Course (green)
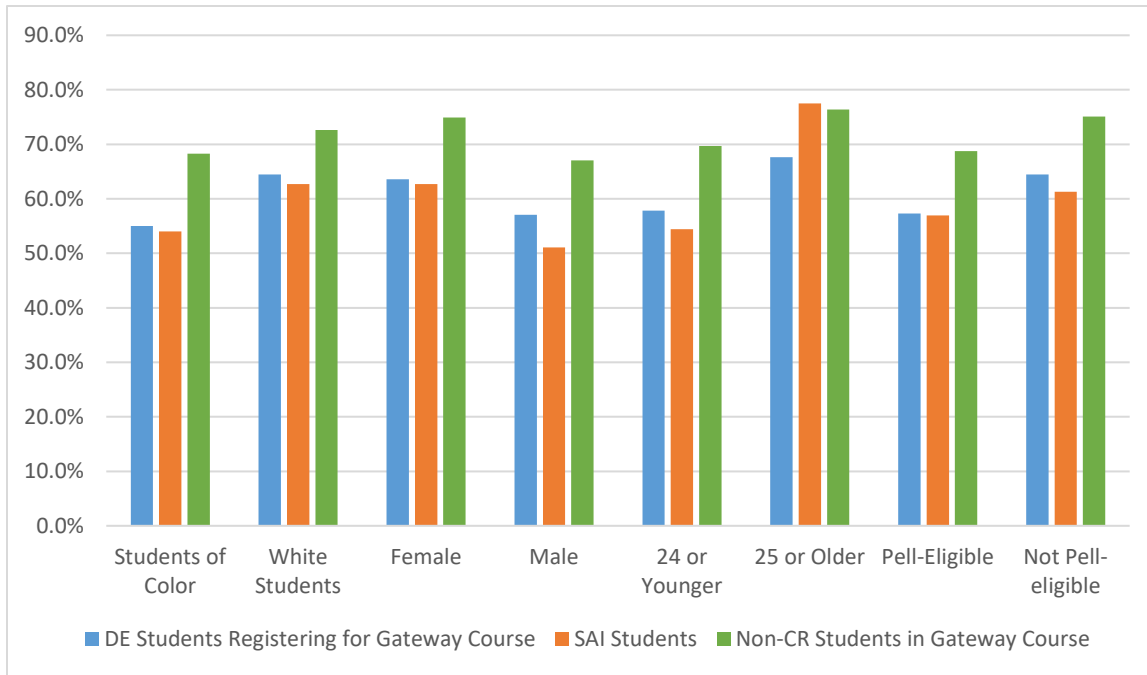
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