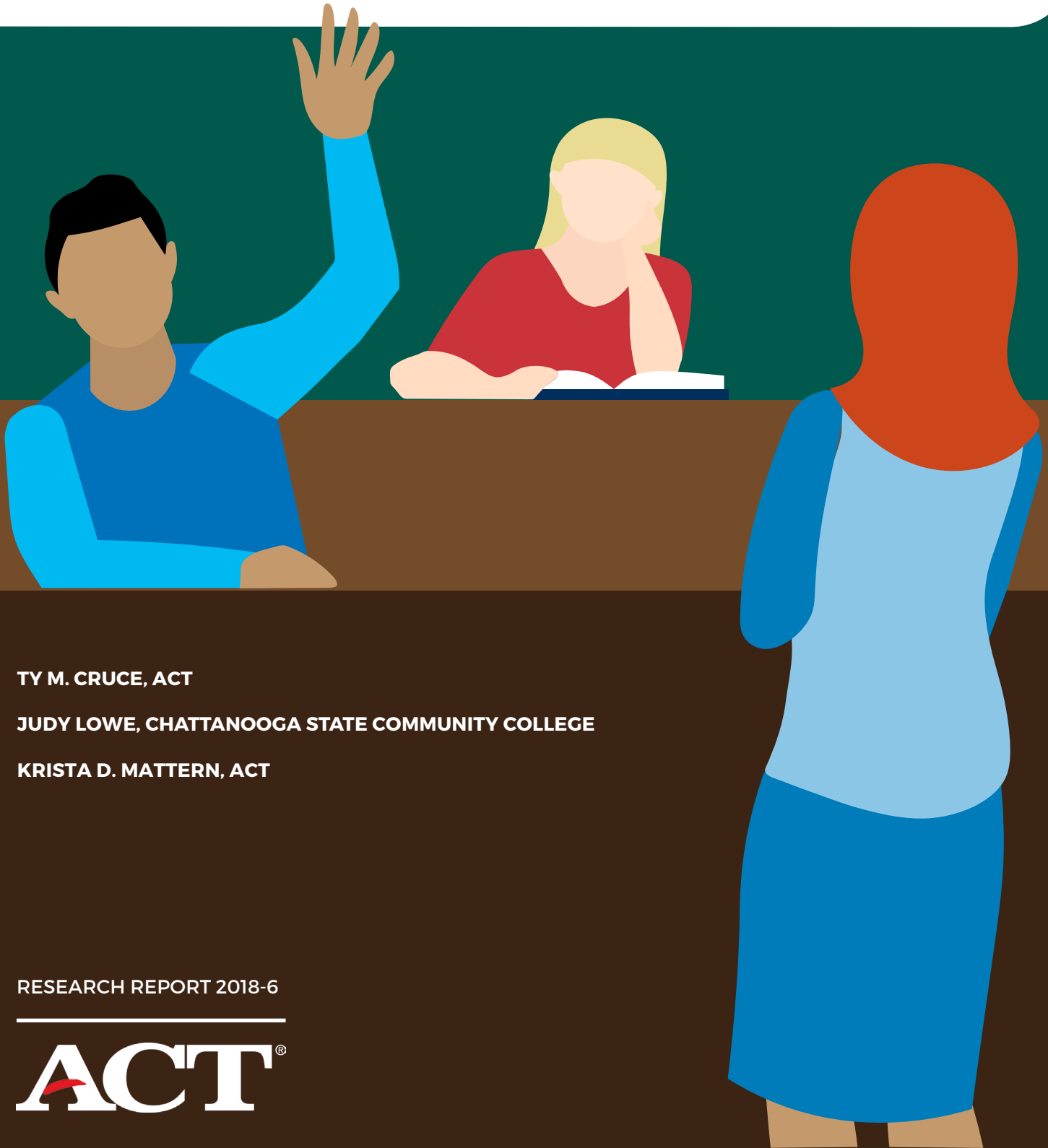


# The Use of CollegeReady to Improve Course Performance in English without the Need for Formal Remediation:

A Case Study at Chattanooga State Community College



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RESEARCH REPORT 2018-6

## SUMMARY

Many students graduate from high school under-prepared for college-level coursework, leading to a large number of students entering college who require remediation in English and mathematics. This study looked at the effectiveness of using EdReady—now offered through ACT as CollegeReady™—as a system for delivering remediation prior to college to improve students' course performance. We found that students who elected to skill-up with the product to the point where they avoided remedial coursework actually out-performed their peers with regard to their pass rate and course grades in their first college-level English composition course, providing promising support for the program. Future research should employ experimental and/or quasi-experimental designs to isolate the causal effect of CollegeReady on college success.

## SO WHAT?

Students are entering college under-prepared for that level of coursework and are requiring remedial courses to catch up. Not only is this time consuming, it is also expensive and may not be very effective. This report shows that using CollegeReady can close this gap and significantly increase course performance and pass rates.

## NOW WHAT?

The results shown in this study, particularly the magnitude of the differences in the course outcomes among the groups, are meaningful and worthy of greater examination. In particular, more robust experimental designs should be used to isolate the causal effect of CollegeReady on college success since students in this design were not randomly assigned.



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# The Use of CollegeReady to Improve Course Performance in English without the Need for Formal Remediation: A Case Study at Chattanooga State Community College

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## Introduction

Many students graduate from high school underprepared for college-level coursework. According to the most recent *The Condition of College & Career Readiness* report (ACT, 2017b), 39% and 53% of the ACT-tested high school graduating class of 2017 did not meet the ACT® College Readiness Benchmarks for English and reading, respectively, and 59% and 63% failed to meet the ACT College Readiness Benchmark for mathematics and science, respectively. The ACT College Readiness Benchmarks are important indicators of early college success, as they represent the level of academic achievement required for students to have a 50% chance of obtaining a B or higher in a corresponding credit-bearing first-year college course (ACT, 2013).

Such a lack of readiness for college-level coursework results in a large number of students entering college who require remediation in English and mathematics prior to (or in conjunction with) their college-level coursework. Based on college transcript data collected as part of the *2003/04 Beginning Postsecondary Students Longitudinal Study*, roughly 68% of students attending two-year public colleges, 39% of students attending four-year public colleges, and 32% of students attending four-year private colleges took at least one remedial course during college (Radford & Horn, 2012). Among those students who took at least one remedial course, students attending two-year colleges took an average of three remedial courses, whereas students attending four-year colleges took an average of two remedial courses. Although remedial courses can be offered for college credit, those credits rarely count toward a student's graduation requirements. This means that students in need of remediation potentially take more time to earn a college degree, increasing

both their direct cost to attend college and their foregone earnings. For example, recent estimates by the education think tank Education Reform Now (Barry & Dannenberg, 2016) suggest that, in 2011, students and their families paid roughly \$1.5 billion out of pocket to cover the direct costs of their remedial coursework in college.

Not only are there additional costs to students and their families when taking remedial coursework in college, but some remedial courses may not be very effective at preparing students for their first college-level course. Evidence from research that has relied primarily on the use of quasi-experimental designs to examine the causal effect of remediation has been mixed (Long & Boatman, 2013). Although some studies (Bettinger & Long, 2009; Lesik, 2007) have found that students receiving remediation were less likely than their peers to leave college and more likely than their peers to complete a degree in a timely manner, most studies to date have either found no statistically significant differences or small negative effects of remediation on various college outcomes for students (Attewell, Lavin, Domina, & Levey, 2006; Calcagno & Long, 2008; Horn, McCoy, Campbell, & Brock, 2009; Moss & Yeaton, 2006; Martorell & McFarlin, 2011; Scott-Clayton & Rodriguez, 2015). In fact, a recent meta-analysis of this literature (Valentine, Konstantopoulos, & Goldrick-Rab, 2017) suggests that traditional remedial courses have a negative effect on students' likelihood of passing a subsequent college-level course, earning more college credits, and eventually earning a degree. It is important to note, however, that the focus of this literature has been limited to the effect of a single remedial course for students who are on the margins of being assigned to either a remedial course versus a college-level course.

There has also been some limited work examining the effects of remediation by the extent of under-

preparedness of the entering students. These studies have used similar quasi-experimental designs but have examined students on the margins of remediation at various cut points across a sequence of remedial courses. Again, this evidence is somewhat mixed. Studies by Dadger (2012) and Melguizo, Bos, Ngo, Mills, and Prather (2016) that focus on mathematics and a study by Hodara (2015) that focuses on English find that students who start in lower levels of the remedial course sequence have significantly lower educational outcomes than students who start directly in a higher level remedial course. Although research by Boatman and Long (2018) confirms this finding for math, their study finds that students may benefit from extra remediation in English and writing.

In part due to the research findings on the ineffectiveness of the traditional remedial coursework model, there has been a growing call for colleges to redesign how they deliver initial and ongoing academic support to students who are in need of greater academic development in order to be successful in college (e.g., *Achieving the Dream*, American Association of Community Colleges, Charles A. Dana Center, Complete College America, Education Commission of the States, & *Jobs for the Future*, 2015; Schak, Metzger, Bass, McCann, & English, 2017). This study looks at the effectiveness of using EdReady—now offered through ACT as CollegeReady—as a system for delivering remediation prior to college to improve students' course performance and early academic success. CollegeReady is a low-stakes college readiness system that assesses students' knowledge in English and mathematics and then provides a personalized learning path to help the student fill in the gaps in their knowledge and skills at their own pace. When the student reaches a milestone score set by the college, the student may advance to college-level coursework without the need for formal remedial coursework.

In this study, we focused on the use of the EdReady product at Chattanooga State Community College (hereafter, ChSCC). ChSCC piloted the product in December 2016 to assist with English course placement for the spring 2017 term and then expanded its use for English course placement for the fall 2017 term. To assess the effectiveness of the product in preparing students for their first college-level English course, we examine differences in the course pass rates and average grades among three groups of students at ChSCC: 1) those who were placed directly into their first college-level course

without any need for remediation (i.e., “Direct Placement” group), 2) those who were placed into their first college-level course while required to complete co-requisite remedial courses in reading and writing (i.e., “Co-requisite” group), and 3) those who placed into their first college-level course without the need for co-requisite remedial coursework due to their use of the product (i.e., “Treatment” group).

## English Placement at ChSCC

For the fall 2017 term, ChSCC used one of several criteria to place students within English Composition I (ENGL1010), a college-level course that counts toward the students' graduation requirements. For many students, the placement decision into ENGL1010 was based on test scores from a prior administration of the ACT. In instances where students did not have ACT scores, ChSCC considered prior Compass® scores or ACCUPLACER® scores for placement. If these test scores were not available, then the students were required to take ACCUPLACER in order to be properly placed.

Students who scored an 18 or higher on the ACT English test and a 19 or higher on the ACT reading test (or a comparable set of Compass or ACCUPLACER scores) were deemed ready for ENGL1010 without the need for remediation. If students' prior test scores were too low for direct placement, students were placed within ENGL1010 without the need for remediation if they had successfully completed a high school English course as part of the Tennessee Seamless Alignment and Integrated Learning Support (TN SAILS) program. TN SAILS is an intervention designed to improve college readiness by allowing students the opportunity to complete college-level remedial coursework and to begin earning college credit while in high school.

If students scored in the range of 13 to 17 on the ACT English test (or in a comparable score range on a different placement test) and had not successfully completed the TN SAILS course in high school, then they were required to take Learning Support Writing (ENGL0810) along with ENGL1010. If students scored in the range of 13 to 18 on the ACT reading test (or in a comparable score range on a different placement test) and had not successfully completed the TN SAILS course in high school, then they were

required to take Learning Support Reading (READ0810) along with ENGL1010. Although both Learning Support Writing and Learning Support Reading were credit-bearing courses that counted toward the students' grade point average, neither co-requisite course counted toward the students' graduation requirements.

All students who did not meet the target scores necessary for direct placement into ENGL1010 (i.e., with no co-requisite remediation) were given the option to use EdReady prior to the beginning of the fall term to improve their course performance without the need for formal remediation.<sup>1</sup> The English section of EdReady comprises ten units, and administrators at ChSCC decided to divide these ten units into two modules, each containing a diagnostic assessment and an accompanying learning path. All students would begin with Module 1, and if they successfully completed this module, they would move on to Module 2.<sup>2</sup> The units covered within each module are as follows:

- Module 1
  - Unit 1: Introduction to College Reading and Writing
  - Unit 2: Identifying Main Ideas
  - Unit 3: Discovering Implied Meaning
  - Unit 4: Interpreting Bias
  - Unit 5: Analysis through Definition
- Module 2
  - Unit 6: Learning across Disciplines
  - Unit 7: Exploring Comparative Elements
  - Unit 8: Informed Opinions through Causal Chains
  - Unit 9: Applied Critical Analysis
  - Unit 10: Using Sources in Critical Reading and Writing

Administrators at ChSCC determined that students who received a target score of 75 each for Module 1 and Module 2 would gain entry into ENGL1010 with no co-requisite remedial coursework.<sup>3</sup> Students who received a target score of 75 for Module 1 but not for Module 2 would be placed in ENGL1010 along with the two co-requisite remedial courses.<sup>4</sup>

## Methods

### Population

The target population for this study is composed of students (N = 1,999) who were registered at ChSCC for the fall 2017 semester and were in need of placement into an English course. Of this target population, 69% (N = 1,387) were placed directly into Composition 1 (ENGL1010) without the need for co-requisite remedial coursework, whereas the other 31% (N = 612) required additional skill-building. Of this latter group, 32% of the students (N = 193) elected to use the product to potentially improve their course performance without the need for formal remediation, whereas the other two-thirds of the students (N = 419) elected not to use the product and remain in formal remediation. Of those students who used the product, 81% (N = 157) reached the target score for both English modules to be placed into ENGL1010 without the need for co-requisite remedial coursework. The other 19% (N = 36) did not reach the target score for the second English module and needed the co-requisite remedial coursework.

### Sample

In our initial analysis, we wanted to control for factors which might reasonably be predicted to affect academic outcomes, based on prior research. In doing so, we had to reduce the sample due to missing data and small cell counts. First, there were not enough students in our sample who used EdReady and still needed to take the co-requisite remedial coursework, so we elected to remove these students (N=36) from our study.<sup>5</sup> Second, given the use of ACT scores in English and reading for placement and due to the incremental value of having both test scores and high school grade point average as predictors of college academic performance (e.g., Sawyer, 2010; Westrick, 2016), we wanted to include these measures as covariates in our statistical models in order to control for past academic performance when assessing the effectiveness of the product to help students skill-up prior to college enrollment. As seen in Table 1, not all students entered ChSCC with both measures of prior academic achievement, so we removed those students (N=659) who were missing either measure. Third, we wanted the students in our sample to have access to a comparable experience within their ENGL1010 course section, but the 102 course sections available to students differed by

characteristics such as their timing and frequency, instructors and mode of instruction, location, and student mix. Since assignment to course section was not random, we elected to limit our study to sections of ENGL1010 that had at least one member from each placement group (i.e., “Direct Placement,” “Co-requisite,” and “Treatment”); in doing so, we removed those students (N =453) who were in course sections where one or more placement groups were not represented. After removing students from our sample based on the aforementioned criteria, there were three racial/ethnic groups (i.e., American Indian, Pacific Islander, and Race Not Specified) that were no longer large enough for inclusion in our study. When we removed these students (N=4), we had a final sample size of 847 students, comprising only 42% of the target population. By setting these inclusion criteria and including these variables as covariates in the model, we can be more confident that the treatment effects are actually due to the treatment and not due to differences in the composition of the three placement groups, as random assignment was not possible. We will, however, relax some of these assumptions in subsequent sensitivity analyses to determine if the findings of our study are unique to the particular constraints that we placed on the data.

Descriptive statistics for the overall target population and study sample are provided in Table 1. As is evident from the table, the study sample differs from the target population in potentially meaningful ways, which may decrease the generalizability of the results from the study sample back to the target population. Specifically, compared to the target population, students who entered directly into ENGL1010 are underrepresented within the sample, whereas students who selected the “Co-requisite” path or the “Treatment” path are overrepresented within the

sample. This underrepresentation of students who entered directly into ENGL1010 without the need for remediation is due in large part to many of these students attending course sections that did not include students from the other two placement groups. Compared to the target population, students in the sample have lower average ACT scores and a lower average high school GPA; they are also more likely to be male and to be Pell eligible. Students in the study sample also have a lower average ENGL1010 pass rate and course grade relative to the target population

Table 2 provides descriptive statistics for the study sample and target population by placement group. This table shows more clearly the implications of restricting the sample on the representativeness of each placement group compared to their respective target population. For example, although the pass rate and average course grade for both the “Treatment” group and the “Direct Placement” group are lower for the sample than for the respective target population, the magnitude of the difference for the “Direct Placement” group is disproportionately greater than that for the “Treatment” group. This pattern is also true for ACT English and reading scores (which are lower for the sample than for the target population) and for the proportion of students who are eligible for a Pell grant (which is higher for the sample than for the target population). Given the potential for the sample restriction to limit the generalizability of the study findings, we estimated additional models that include fewer control variables and thus allowed for a larger sample to gauge the robustness of the findings.

**Table 1.** Descriptive Statistics for Study Sample and Target Population<sup>a</sup>

| Variable                          | Sample |       | Population |       |
|-----------------------------------|--------|-------|------------|-------|
|                                   | Mean   | SD    | Mean       | SD    |
| <i>Outcomes</i>                   |        |       |            |       |
| ENGL1010 Pass Rate                | 0.629  | 0.483 | 0.691      | 0.462 |
| Completers only <sup>b</sup>      | 0.772  | 0.420 | 0.820      | 0.384 |
| ENGL1010 Course Grade             | 1.929  | 1.634 | 2.215      | 1.637 |
| Completers only <sup>b</sup>      | 2.368  | 1.495 | 2.627      | 1.448 |
| <i>Placement Group</i>            |        |       |            |       |
| Direct Placement                  | 0.616  | 0.487 | 0.694      | 0.461 |
| Co-requisite                      | 0.279  | 0.449 | 0.210      | 0.407 |
| Treatment <sup>c</sup>            | 0.105  | 0.307 | 0.079      | 0.269 |
| Treatment + Co-requisite          |        |       | 0.018      | 0.133 |
| <i>Prior Academic Achievement</i> |        |       |            |       |
| ACT English Score <sup>d</sup>    | 17.849 | 4.448 | 19.257     | 5.048 |
| ACT Reading Score <sup>d</sup>    | 19.172 | 4.767 | 20.402     | 5.160 |
| High School GPA <sup>e</sup>      | 2.894  | 0.565 | 2.890      | 0.614 |
| <i>Background Characteristics</i> |        |       |            |       |
| Age                               | 19.466 | 2.580 | 20.203     | 5.007 |
| Female <sup>c</sup>               | 0.511  | 0.500 | 0.548      | 0.498 |
| Male                              | 0.489  | 0.500 | 0.452      | 0.498 |
| African American                  | 0.156  | 0.363 | 0.150      | 0.357 |
| American Indian                   | 0.000  | 0.000 | 0.003      | 0.055 |
| Asian                             | 0.015  | 0.123 | 0.016      | 0.124 |
| Hispanic                          | 0.074  | 0.263 | 0.071      | 0.257 |
| Pacific Islander                  | 0.000  | 0.000 | 0.002      | 0.039 |
| White <sup>c</sup>                | 0.711  | 0.454 | 0.710      | 0.454 |
| Multiracial                       | 0.044  | 0.205 | 0.045      | 0.206 |
| Race Not Specified                | 0.000  | 0.000 | 0.005      | 0.071 |
| Pell Eligible                     | 0.560  | 0.497 | 0.440      | 0.497 |
| <i>N</i>                          | 847    |       | 1999       |       |

a. Means and standard deviations for 58 course section indicator variables are not included in the table.

b. Students who did not earn a grade of "FA," "I," or "W." Sample N = 690, Population N = 1685

c. Indicates reference group in our models.

d. Population N = 1670 for ACT Subject scores.

e. Population N = 1546 for High School GPA.



**Table 2.** Descriptive Statistics for Study Sample and Target Population by Placement Group<sup>a</sup>

| Variable                          | Sample    |       |                  |       |              |       | Target Population |       |                  |       |              |       |
|-----------------------------------|-----------|-------|------------------|-------|--------------|-------|-------------------|-------|------------------|-------|--------------|-------|
|                                   | Treatment |       | Direct Placement |       | Co-requisite |       | Treatment         |       | Direct Placement |       | Co-requisite |       |
|                                   | Mean      | SD    | Mean             | SD    | Mean         | SD    | Mean              | SD    | Mean             | SD    | Mean         | SD    |
| <i>Outcomes</i>                   |           |       |                  |       |              |       |                   |       |                  |       |              |       |
| ENGL1010 Pass Rate                | 0.719     | 0.452 | 0.653            | 0.476 | 0.542        | 0.499 | 0.752             | 0.433 | 0.740            | 0.439 | 0.525        | 0.500 |
| Completers only <sup>b</sup>      | 0.810     | 0.395 | 0.793            | 0.406 | 0.707        | 0.456 | 0.843             | 0.365 | 0.857            | 0.350 | 0.694        | 0.462 |
| ENGL1010 Course Grade             | 2.191     | 1.573 | 2.080            | 1.652 | 1.496        | 1.537 | 2.357             | 1.548 | 2.443            | 1.603 | 1.470        | 1.549 |
| Completers only <sup>b</sup>      | 2.468     | 1.449 | 2.526            | 1.480 | 1.950        | 1.481 | 2.643             | 1.389 | 2.831            | 1.371 | 1.943        | 1.500 |
| <i>Prior Academic Achievement</i> |           |       |                  |       |              |       |                   |       |                  |       |              |       |
| ACT English Score <sup>c</sup>    | 15.011    | 3.436 | 19.556           | 4.484 | 15.144       | 2.313 | 15.565            | 3.386 | 21.041           | 4.716 | 15.012       | 2.387 |
| ACT Reading Score <sup>c</sup>    | 15.764    | 3.180 | 20.841           | 4.787 | 16.767       | 3.288 | 16.481            | 3.183 | 22.052           | 4.910 | 16.568       | 3.283 |
| High School GPA <sup>d</sup>      | 2.840     | 0.548 | 3.010            | 0.549 | 2.657        | 0.532 | 2.837             | 0.574 | 3.029            | 0.588 | 2.582        | 0.576 |
| <i>Background Characteristics</i> |           |       |                  |       |              |       |                   |       |                  |       |              |       |
| Age                               | 19.424    | 3.254 | 19.496           | 2.547 | 19.416       | 2.367 | 20.159            | 4.974 | 19.969           | 4.978 | 20.904       | 5.041 |
| Female <sup>e</sup>               | 0.472     | 0.502 | 0.504            | 0.500 | 0.542        | 0.499 | 0.529             | 0.501 | 0.552            | 0.497 | 0.542        | 0.499 |
| Male                              | 0.528     | 0.502 | 0.496            | 0.500 | 0.458        | 0.499 | 0.471             | 0.501 | 0.448            | 0.497 | 0.458        | 0.499 |
| African American                  | 0.124     | 0.331 | 0.134            | 0.341 | 0.216        | 0.412 | 0.115             | 0.320 | 0.114            | 0.318 | 0.263        | 0.441 |
| American Indian                   | 0.000     | 0.000 | 0.000            | 0.000 | 0.000        | 0.000 | 0.000             | 0.000 | 0.003            | 0.054 | 0.005        | 0.069 |
| Asian                             | 0.011     | 0.106 | 0.015            | 0.123 | 0.017        | 0.129 | 0.019             | 0.137 | 0.015            | 0.122 | 0.017        | 0.128 |
| Hispanic                          | 0.090     | 0.288 | 0.056            | 0.229 | 0.110        | 0.314 | 0.089             | 0.286 | 0.061            | 0.239 | 0.103        | 0.304 |
| Pacific Islander                  | 0.000     | 0.000 | 0.000            | 0.000 | 0.000        | 0.000 | 0.006             | 0.080 | 0.001            | 0.038 | 0.000        | 0.000 |
| White <sup>e</sup>                | 0.742     | 0.440 | 0.743            | 0.437 | 0.627        | 0.485 | 0.707             | 0.457 | 0.755            | 0.430 | 0.573        | 0.495 |
| Multiracial                       | 0.034     | 0.181 | 0.052            | 0.222 | 0.030        | 0.170 | 0.038             | 0.192 | 0.047            | 0.211 | 0.041        | 0.198 |
| Race Not Specified                | 0.000     | 0.000 | 0.000            | 0.000 | 0.000        | 0.000 | 0.025             | 0.158 | 0.004            | 0.066 | 0.000        | 0.000 |
| Pell Eligible                     | 0.517     | 0.503 | 0.548            | 0.498 | 0.602        | 0.491 | 0.414             | 0.494 | 0.366            | 0.482 | 0.678        | 0.468 |
| <i>N</i>                          | 89        |       | 522              |       | 236          |       | 157               |       | 1387             |       | 419          |       |

a. Means and standard deviations for course section indicator variables are not included in the table.

b. Students who did not earn a grade of “FA,” “I,” or “W.” Sample Ns = 79, 430, and 181; Population Ns = 140, 1197, and 317

c. Population Ns = 131, 1176, and 338 for ACT Subject scores.

d. Population Ns = 125, 995, and 391 for High School GPA.

e. Indicates reference group in our models.

## Variables

Operational definitions for all study variables are provided in this section. Overall sample statistics for these study variables are provided in Table 1, and a comparison of these sample statistics by placement group is provided in Table 2.

### **ENGL1010 Pass/Fail Status**

For this outcome, we defined “passing” as having received a course grade of “A,” “B,” “C,” or “D,” and we defined “failing” as having received a grade of “F,” “FA” (i.e., failure due to absences), “I” (i.e., incomplete), or “W” (i.e., withdrew). Operationally, “passing” was coded as 1 and “failing” was coded as 0. Table 1 shows an ENGL1010 pass rate of 63% for our sample based on this definition. It is important to note that one-half of all students in our sample who “failed” by this definition had received a grade of “FA,” “I,” or “W.” Among those students in our sample who actually completed the course, the ENGL1010 pass rate was 77%.

### **ENGL1010 Course Grade**

For this outcome, we placed the student’s course grade on a 4.0 numeric scale, where “A” = 4, “B” = 3, “C” = 2, “D” = 1, and “F” = 0; “FA,” “I,” and “W” were also coded as 0. By this definition, the average course grade for our sample was 1.93. It is important to note that coding students’ failures due to absence, course incompletes, and course withdrawals as 0 means that the average course grade is not representative of those students who actually completed the course; the average course grade for course completers was 2.37.

### **Course Placement Group**

We used a series of dummy-coded variables to indicate membership in one of three placement groups: “Direct Placement,” “Co-requisite,” and “Treatment.” The variable representing the treatment group was left out of our statistical models to serve as the reference group when interpreting the parameter estimates for the other two variables.

### **ACT Scores**

ChSCC uses students’ scores on the ACT English and ACT reading tests to help with course placement.

We included these two subject tests in our analyses in order to statistically control for prior academic achievement in these areas. Each test has a score range of 1 to 36. Please see *The ACT® Technical Manual* (ACT, 2017a) for more information on the content and predictive validity of these tests. For our regression analyses, we transformed each of these measures to have a sample mean of zero and a sample standard deviation of one.

### **High School GPA**

We included grade point average from high school transcripts in our model as an additional statistical control for prior academic achievement. Often, high school GPA and standardized test scores together provide a better prediction of college academic performance than one measure alone (e.g., Sawyer, 2010; Westrick, 2016). Although high school GPA is on a four-point scale, students can earn over a 4.0 in the event that they have taken Advanced Placement (AP) coursework.

### **Background Characteristics**

We included a number of student background variables as additional statistical controls in our analyses. These variables include age at the start of the fall 2017 term and a series of dummy-coded variables representing the students’ gender, race or ethnicity, and income eligibility to receive a Pell grant.

### **Course Section**

Although all students in the sample took ENGL1010, they were divided into 58 course sections, and their experience with the course likely differed by their course section. These differences include the time of day in which they received the course (morning, afternoon, and evening), the number of days per week that they received the course (one, two, or three), the instructor who taught the course (N = 30 for our sample), the mode in which the course was offered (in-person or online), the campus in which the course was offered (N = 3 for our sample), and the mixture of students within the course by their placement group. To account for possible differences in their experience with the course, we included 57 of the 58 dummy-coded variables for course section in our model. One course section variable was left out of the model to serve as the reference group for the other variables. The average number of students per course section in our sample was 14.6, with a

minimum of six students, a maximum of 20 students, and a mode of 15 students.

## Analyses

We used Ordinary Least Squares (OLS) Regression to address each of our course outcomes. In the model where we predicted the students' course pass/fail status, the OLS model served as a linear probability model. Under this model, the parameter estimates for continuous variables are interpreted as a change in the students' probability of passing ENGL1010 given a one-unit increase in the predictor variable; the parameter estimates for dummy-coded variables are interpreted as the difference in the students' probability of passing ENGL1010 for students with that group membership compared to students in the reference group. In the model where we predicted course grade, the parameter estimates for continuous variables are interpreted as a change in the students' ENGL1010 numeric grade given a one-unit increase in the predictor variable; the parameter estimates for dummy-coded variables are interpreted as the difference in the students' ENGL1010 numeric grade for students with that group membership compared to students in the reference group.

## Results

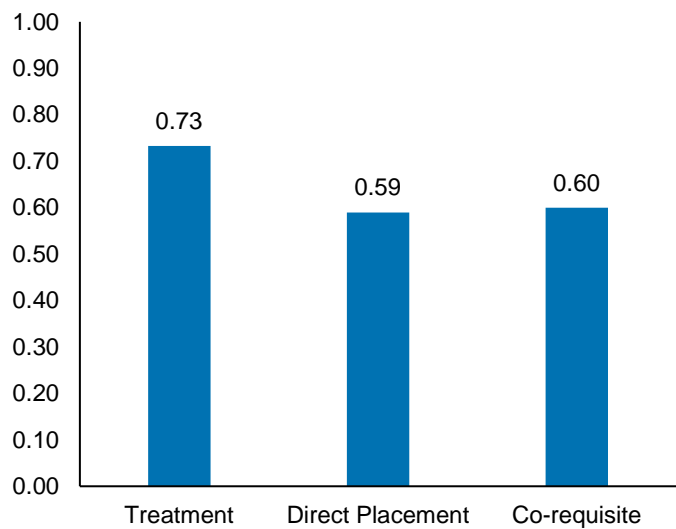
### ENGL1010 Pass/Fail Status

The omnibus test for our linear probability model predicting the students' ENGL1010 course pass/fail status was statistically significant ( $F = 3.24$ ,  $df = 69$ ), and the model R-square indicated that the variables in our model accounted for roughly 22% of the variance in the pass rate. After accounting for the students' prior academic performance and other covariates, we found that students in both the "Direct Placement" and "Co-requisite" groups had estimated pass rates that were statistically significantly lower than the estimated pass rate for the "Treatment" group. Specifically, the "Direct Placement" and "Co-requisite" groups had estimated pass rates that were 14.3 and 13.3 percentage points lower, respectively, than the estimated pass rate of the "Treatment" group, after adjusting for other variables in the model. A post-hoc test of the difference in the parameter estimates for the "Direct Placement" and "Co-requisite" groups was

not statistically significant, suggesting that there is no meaningful difference between the pass rates of these two groups.

Figure 1 shows the predicted pass rates for all three groups after holding all other variables in the model at their sample mean values. As the figure illustrates, controlling for prior academic achievement and other background characteristics, students who used the product had an estimated pass rate of 73%, compared to estimated pass rates of 59% and 60% for the "Direct Placement" and "Co-requisite" groups. Again, the predicted pass rates for the "Direct Placement" and "Co-requisite" groups are not statistically significantly different from each other.

**Figure 1.** Predicted Pass Rate for First College-Level English Composition Course



With regard to measures of prior academic achievement, ACT English score and high school GPA were both uniquely and positively related to the students' probability of passing ENGL1010. The parameter estimate for ACT reading score was statistically non-significant, suggesting that it does not add uniquely to the prediction of the course pass rate after also taking into consideration the students' ACT English score and high school GPA. This lack of effect is likely the result of ACT reading scores being highly-correlated with ACT English scores (0.71 for this sample).

**Table 3.** Regression Results for ENGL1010 Pass Rate and Course Grade<sup>a</sup>

| Variable                       | Pass Rate |       |        |         | Course Grade |       |        |         |
|--------------------------------|-----------|-------|--------|---------|--------------|-------|--------|---------|
|                                | B         | SE    | t      | pr >  t | B            | SE    | t      | pr >  t |
| Intercept                      | -0.599    | 0.216 | -2.780 | 0.006   | -3.228       | 0.676 | -4.780 | 0.000   |
| Direct Placement               | -0.143    | 0.056 | -2.550 | 0.011   | -0.493       | 0.176 | -2.800 | 0.005   |
| Co-requisite                   | -0.133    | 0.057 | -2.320 | 0.021   | -0.515       | 0.180 | -2.870 | 0.004   |
| ACT English Score <sup>b</sup> | 0.056     | 0.024 | 2.280  | 0.023   | 0.249        | 0.076 | 3.260  | 0.001   |
| ACT Reading Score <sup>b</sup> | -0.031    | 0.023 | -1.350 | 0.179   | -0.081       | 0.072 | -1.130 | 0.259   |
| High School GPA                | 0.282     | 0.033 | 8.610  | 0.000   | 1.114        | 0.102 | 10.880 | 0.000   |
| Age                            | 0.030     | 0.007 | 4.460  | 0.000   | 0.127        | 0.021 | 6.090  | 0.000   |
| Male                           | -0.012    | 0.033 | -0.360 | 0.718   | -0.074       | 0.102 | -0.730 | 0.468   |
| African American               | 0.012     | 0.049 | 0.260  | 0.797   | 0.004        | 0.152 | 0.020  | 0.981   |
| Asian                          | 0.023     | 0.130 | 0.180  | 0.857   | 0.336        | 0.406 | 0.830  | 0.408   |
| Hispanic                       | -0.023    | 0.063 | -0.370 | 0.714   | -0.171       | 0.196 | -0.870 | 0.385   |
| Multiracial                    | 0.022     | 0.078 | 0.280  | 0.776   | 0.025        | 0.244 | 0.100  | 0.918   |
| Pell Eligible                  | -0.057    | 0.034 | -1.700 | 0.089   | -0.206       | 0.105 | -1.960 | 0.051   |

a. Parameter estimates and standard errors for 57 dummy-coded variables representing course section fixed effects are not included in the table.

b. Prior to analysis, variable was standardized to have a sample mean of zero and a sample standard deviation of 1.

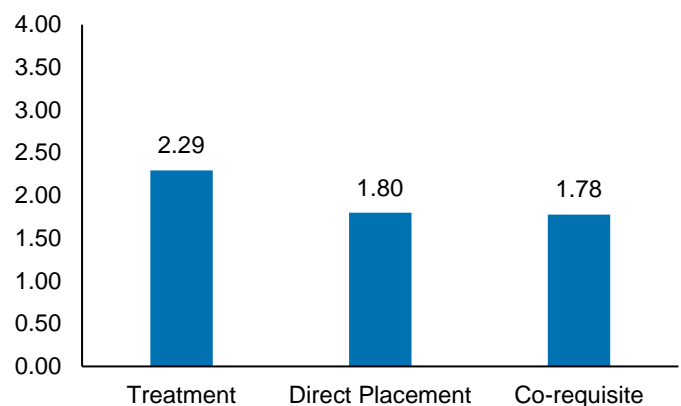
### ENGL1010 Course Grade

The omnibus test for our model predicting ENGL1010 course grades was statistically significant ( $F = 5.64$ ,  $df = 69$ ), and the model R-square indicated that the variables in our model accounted for roughly 33% of the variance in students' course grades. As with the analysis of the course pass rate, after accounting for the students' prior academic performance and other covariates, we found that students in both the "Direct Placement" and "Co-requisite" groups had course grades that were statistically significantly lower than the course grades for the "Treatment" group. Specifically, the "Direct Placement" and "Co-requisite" groups had estimated average course grades that were 0.49 and 0.52 points lower, respectively, than the estimated average course grade of the "Treatment" group, after statistically accounting for other variables in the model. A post-hoc test of the difference in the parameter estimates for the "Direct Placement" and "Co-requisite" groups was not statistically significant, suggesting that there is no meaningful difference between the average course grades of these two groups.

Figure 2 shows the predicted average English 1010 course grade for all three groups after holding all other variables in the model at their total sample

mean values. As the figure shows, after accounting for prior academic achievement and other background characteristics, students who used the product had an estimated average course grade of 2.29 (on a 4.0 numeric scale), compared to an estimated average course grade of 1.80 and 1.78 for the "Direct Placement" and "Co-requisite" groups, respectively. Again, the difference in the predicted average course grades for the "Direct Placement" and "Co-requisite" groups is not statistically significant.

**Figure 2.** Predicted Average Grade for First College-Level English Composition Course (4.0 Numeric Scale)



As with our model predicting the ENGL1010 pass rate, two of the three measures of prior academic achievement—ACT English score and high school GPA—were uniquely and positively related to course grades. As with the other model, the parameter estimate for ACT reading score was statistically non-significant, suggesting that it does not add uniquely to the prediction of the course grades after also taking into consideration the students' ACT English score and high school GPA. Again, this lack of effect is likely the result of ACT reading scores being highly-correlated with ACT English scores.

## Sensitivity Analyses

Although we felt that this more restrictive sample provided a more robust analysis of the end-of-course outcomes for the three groups, we were concerned about the generalizability of the findings to the broader population of students at ChSCC who were being placed into their first English course. That is, readers may wonder if a positive effect for EdReady would still be observed if we didn't impose the aforementioned inclusion criteria. To assuage these concerns, we evaluated the extent to which the study findings were due to our restriction of the sample by conducting some sensitivity analyses where we estimated additional models with fewer restrictions on the sample. We first estimated our outcome models after lifting the restriction that at least one student per group had to be in each course section to be included in the analysis; this increased our study sample from 847 to 1,297 (i.e., from 42% to 65% of the target population). The results of these models (not tabled in this report) are statistically significant and consistent in direction with that of our restricted sample. Compared to the "Treatment" group, the "Direct Placement" and "Co-requisite" groups had estimated pass rates that were 11.4 and 13.1 percentage points lower and estimated average course grades that were 0.42 and 0.51 points lower after adjusting for other variables in the model.

We also estimated our outcome models after lifting the additional restriction that students have a reported high school GPA, increasing the study sample from 1,297 to 1,629 (i.e., from 65% to 81% of the target population). Again, the results of these models (not tabled in this report) are statistically significant and consistent in direction with that of our restricted sample. In this specification, we found that the "Direct Placement" and "Co-requisite" groups had estimated pass rates that were 8.8 and 13.1 percentage points

lower and estimated average course grades that were 0.29 and 0.61 points lower than the "Treatment" group after adjusting for other variables in the model. Despite different model specifications, our findings were fairly robust in suggesting that students who used the product had significantly higher pass rates and course grades than students in the other two groups.

## Discussion

In this study, we learned that, compared to those students who either entered directly into ENGL1010 or had to take co-requisite developmental coursework along with ENGL1010, students in the treatment group had a pass rate for ENGL1010 that was about 13 to 14 percentage points higher, and they had an average course grade for ENGL1010 that was roughly 0.50 points higher on a 4.0 numeric scale. The magnitude of the differences in the course outcomes among these groups—even after the introduction of a modest set of statistical controls into the estimated model—is meaningful and worthy of greater examination.

The findings of this study are promising. As for future research, more robust experimental and/or quasi-experimental designs should be employed to isolate the causal effect of CollegeReady on college success. As part of the program design, students were not randomly assigned to the treatment group. Although all students who were initially placed into the co-requisite developmental coursework track had the opportunity to use the product to increase their course performance without the need for formal remediation, only one-third of the students took advantage of that opportunity. We don't know how these findings might change if there was 100% participation in the program, as might be the case if students are required to use the program rather than opting in. If students in this study self-selected into the treatment group on the basis of some personal characteristics such as motivation or strong academic behaviors—which have also been positively linked to education success—the magnitude of the effect that we have reported may be partly due to unobserved differences in the groups (Robbins, Allen, Casillas, Peterson, & Le, 2006) rather than to the product *per se*. Research designs employing experimental or quasi-experimental methods would allow us to account for these other potential explanatory variables and more definitively describe EdReady's effect on student outcomes.

Additionally, future research should seek to understand why more students did not take advantage of the product. For example, do the students who opted out prefer one-on-one instruction as opposed to self-paced, online learning? Future research should explore and identify barriers that limit participation as well as factors that promote participation to help inform best practices around implementation, adoption, and ultimately student success.

## Conclusion

This study focuses on the effectiveness of EdReady—now offered through ACT as CollegeReady—in preparing students for college-level coursework. In the current study, we found that those ChSCC students who elected to skill-up with the product to the point where they avoided the co-requisite remedial coursework actually out-performed their peers with regard to their pass rate and course grades in their first credit-bearing English composition course. In this study, we were not able to use an experimental or quasi-experimental design that would allow us to isolate the causal effect of EdReady on college success. However, using the most robust methods available to us, we found that students who use the EdReady product performed better academically than their peers.

It is important to note that the manner in which EdReady was implemented at ChSCC for English placement is different than the standard implementation protocol for CollegeReady. Specifically, administrators at ChSCC used standardized test scores from the ACT, Compass, or ACCUPLACER to establish an initial placement decision for each student, and then some students were offered the option to use EdReady as an alternative to formal remediation. Administrators at ChSCC also decided to break the English units into two different modules, each with their own diagnostic, learning path, and particular target score. In contrast to this implementation, CollegeReady may be administered to all students without requiring students to complete initial placement testing. Under this approach, results of the CollegeReady diagnostic creates a learning path for each student, and a set of milestone scores that students reach on their learning path have been established as recommendations for course placement. CollegeReady also combines all English units into a single module with a set of initial

milestone scores that colleges can adjust over time based on their local course outcomes.

Although these implementation approaches are somewhat different, they are based on the same learning model tied to college readiness. With that in mind, we have initial evidence that institutions using CollegeReady for the purpose of helping students increase their English preparation—with the ultimate goal of reducing the need for formal remediation and increasing course performance—will find comparable results. Further research based on the implementation of CollegeReady that uses experimental or quasi-experimental designs would bolster the evidence for the effectiveness of the product across a diversity of institutional contexts and implementations, but the findings thus far are a promising start.

## Notes

1. Students who did not meet the minimum score for placement into the co-requisite reading or writing courses had the option to retest or to use EdReady.
2. The decision to divide the EdReady English units into two modules is unique to the implementation at ChSCC and is not equivalent to the standard implementation protocol for CollegeReady, which combines all ten units into a single diagnostic and learning path.
3. The EdReady target scores set by administrators at ChSCC are unique to their implementation and differ from the milestone scores established for CollegeReady.
4. Students who did not successfully complete Module 1 or retest to improve their placement score were not permitted to enroll in ENGL1010 and the co-requisite courses.
5. These 36 students completed Module 1 but not Module 2. If sample sizes permit, it would be important for future research to examine the differences in course outcomes among ChSCC students who elected to use EdReady but failed to meet the target score for Module 2 (thus placing them in the co-requisite path) and those ChSCC students on the co-requisite path who elected not to use EdReady.

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