Online and Hybrid Course Enrollment and Performance in Washington State Community and Technical Colleges

Di Xu and Shanna Smith Jaggars

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Address correspondence to:

Shanna Smith Jaggars
Senior Research Associate, Community College Research Center
Teachers College, Columbia University
525 West 120th Street, Box 174
New York, NY 10027
212-678-3091
Email: jaggars@tc.columbia.edu

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Abstract

This report investigates enrollment patterns and academic outcomes in online, hybrid, and face-to-face courses among students who enrolled in Washington State community and technical colleges in the fall of 2004. Students were tracked for nearly five years, until the spring of 2009. Results were similar to those found in a parallel study in Virginia (Jaggars & Xu, 2010).

Students who were employed for more hours and students who had demographic characteristics associated with stronger academic preparation were more likely to enroll in online courses; however, students who enrolled in hybrid courses were quite similar to those who enrolled in a purely face-to-face curriculum. After controlling for student characteristics using multilevel regression techniques, results indicated that students were more likely to fail or withdraw from online courses than from face-to-face courses. In addition, students who took online coursework in early terms were slightly but significantly less likely to return to school in subsequent terms, and students who took a higher proportion of credits online were slightly but significantly less likely to attain an educational award or transfer to a four-year institution. In contrast, students were equally likely to complete a hybrid course as to complete a face-to-face course. Additional analyses with a new cohort of students entering in 2008 showed short-term results consistent with those of the 2004 cohort.

Given the importance of online learning in terms of student convenience and institutional flexibility, current system supports for online learning should be bolstered and strengthened in order to improve completion rates among online learners. Specific recommendations are discussed in the report's conclusion.

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1. Introduction

Online learning has been expanding rapidly in availability and popularity in U.S. colleges in the past decade, with the most recent data demonstrating no signs of slowing: More than 29% of higher education students took at least one online course during the fall 2009 term, a 21% increase over the number reported the previous year, which far exceeded the 1.2% growth of the overall higher education student population (Allen & Seaman, 2010). While hard numbers on the growth of *online* education within the community college sector are not available, information on *distance* education suggests a stronger increase among community colleges than among four-year colleges. In 1997–98, public two- and four-year institutions each had approximately 710,000 enrollments in distance education courses (Choy, 2002). In 2006–07, distance enrollments at public two-year institutions rose to nearly 5 million, approximately twice as many enrollments as there were in distance education at public four-year institutions (Parsad & Lewis, 2008). Community colleges may be particularly interested in increasing online enrollments in order to accommodate the need for flexibility among their student population, many of whom hold part- or full-time jobs (Kleinman & Entin, 2002).

Numerous empirical studies have compared student outcomes between the online course delivery format and its traditional classroom counterpart. Although the "no significant difference" phenomenon between face-to-face and distance education described by Russell (2001) continues to dominate the literature, the majority of studies in this area focus on well-prepared university students and ignore important concerns regarding higher withdrawal rates among online courses. The few empirical studies that have compared online and face-to-face outcomes in the community college setting suggest that students are substantially less likely to complete online courses, even after controlling for a wide array of student characteristics (Carpenter, Brown, & Hickman, 2004; Jaggars & Xu, 2010; Xu & Jaggars, 2010; Zavarella, 2008). Overall across studies, students who took a given course online had estimated withdrawal rates that were 10 to 15 percentage points higher than students who took the course face-to-face (Jaggars, 2011). Students in online courses often complain of technical difficulties, a sense of isolation, a relative lack of structure, and a general lack of support, all of which may contribute to low completion rates (Jaggars, 2011).

Starting in the late 1990s when online education began to flourish, some educators have discouraged students from taking fully online courses (Young, 2002), arguing that "technology cannot replace the human factor in higher education" (Merisotis & Phipps, 1999, p. 31). To take advantage of the technical opportunities and convenience of an online environment, yet at the same time incorporate face-to-face contact with the instructor and social involvement with classmates, many researchers have recommended that colleges focus more strongly on hybrid courses (Brown, 2001; Carnevale, 2002; Oblender, 2002; Ward, 2004; Young, 2002). A set of well-designed empirical studies suggest that hybrid courses result in similar or better learning outcomes in comparison to face-to-face courses (U.S. Department of Education, 2009), although none of these studies focused on community college students. A handful of case studies also suggest that hybrid courses can be an effective alternative to face-to-face courses among low-income students (Twigg, 2005).

In order to better understand online and hybrid course-taking and success among community college students, CCRC conducted the current study based on administrative and transcript data available through the Washington State Board of Community and Technical Colleges (SBCTC). Washington represents an excellent context for the study of online learning, as the community and technical college system provides a number of online learning supports that should create an environment conducive to high-quality online learning. In 1998, the system implemented several key supports:

- *Student online readiness assessment*: The system's online readiness quiz provides specific feedback to students in terms of whether they are likely to be as successful in an online course as in a face-to-face course.
- *Course management system tutorial*: In the week prior to the start of an online course, students are encouraged to take a free online tutorial on how to use the system's online course management system.
- *Online support services*: Most colleges in the system provide round-the-clock online technical support for students, and all colleges offer round-the-clock online reference librarian support.

- *Faculty development support*: Most online faculty are required to take training that is focused on the use of the online course management system. Also available to interested faculty are additional courses that focus on effective online pedagogies, advanced technological tools, and other topics.

In this study, we focus on students who entered the Washington system in 2004, subsequent to the implementation of these system-wide supports.[1] In particular, we examine: (1) patterns of online and hybrid course-taking among Washington community and technical college students; (2) college-ready and underprepared students' retention and performance in online, hybrid, and face-to-face courses; and (3) subsequent educational outcomes for underprepared and college-ready students who participate in online and hybrid learning early in their college careers.

2. Data and Methods

Primary analyses were performed on a dataset containing 51,017 degree-seeking students who initially enrolled[2] in one of Washington State's 34 community or technical colleges during the fall term of 2004. These first-time college students were tracked through the spring of 2009 for 19 quarters of enrollment[3] or approximately five years. (Supplemental analyses were also performed on students who enrolled in the fall of 2008; see Section 5.) The dataset contains information on student demographics, employment information in each quarter, institutions attended, transcript data on courses taken and grades received, and information on educational attainment. Information on each course is also included, such as the course subject, whether it was a developmental or college-level course, and whether it was an online, hybrid, or face-to-face course. In the time period under study, an online course was defined as one in which 51% or more of the instruction and student-teacher interaction was online; in a hybrid course, online

[1] The system has implemented additional supports within the past three years, which are discussed in more detail in the conclusion section.
[2] This sample does not include students who were dual enrolled during the fall term of 2004 (N = 6,039).
[3] There are four quarters in each academic year, which starts in summer and ends in spring. We also refer to a quarter as a "term."

technology was used to displace less than 51% of the course delivery; in a face-to-face course, no classroom time was displaced.[4]

Analyses were sometimes conducted with the student as the unit of analysis and at other times with the course as the unit of analysis, as noted in each analysis. To ensure a consistent student sample size regardless of the unit of analysis, non-credit courses (e.g., an EXCEL 2000 workshop) or courses with no valid outcomes (e.g., audited courses) were dropped from the dataset. There was no systematic difference across the three course delivery formats in terms of the proportion dropped. Removing these courses also dropped 716 students (less than 1% of the sample) who only took such courses, resulting in 50,306 students (and 590,169 courses taken by those students) for analysis.

We defined students' preparation for college-level coursework according to whether the student ever enrolled in at least one remedial course in English or math. Across the sample, 40% of students took a remedial course in one or both subjects: 14% of students enrolled in developmental English, while 36% enrolled in developmental math.

3. Findings

3.1 Characteristics of Students Enrolling in Online and Hybrid Coursework

Across their first fall term of enrollment at Washington community colleges, 10% of students attempted at least one online course and 2% at least one hybrid course; across their first year, 20% of students attempted an online course and 4% attempted a hybrid course; across their entire community college career (through spring 2009), 33% attempted an online course and 9% attempted a hybrid course.

Table 1.1 presents online and hybrid course enrollment rates among key demographic groups in the first term (fall 2004), first year (summer 2004–spring 2005), and across the entire student career (through spring 2009). On a descriptive basis, it

[4] To ensure a more accurate understanding of these courses, the system's definitions were revised subsequent to the period under study. In 2011, an online course is defined by SBCTC as one in which 100% of the instruction and student-instructor interaction is performed online. In a hybrid course, some but not all face-to-face classroom time is displaced by online technology; in a web-enhanced course, the course is enhanced by online technology, but no seat time is displaced.

appears that online courses were consistently more popular among women, White and multiracial students, students who applied and were eligible for federal need-based aid, English-fluent students, students from higher quintiles of socioeconomic status (SES),[5] and students with a stronger level of academic preparation (students on the transfer track, and students who had been dual-enrolled prior to enrollment). In contrast, students enrolled in hybrid courses seemed quite similar to those enrolled in face-to-face courses in terms of the characteristics listed in Table 1.1, except that hybrid courses seemed slightly more popular among English-fluent students and students who had been dual-enrolled prior to enrollment.

Given that some student characteristics change from term to term (such as full-time student status and employment status), we also explored relationships between variables that can change over time and online or hybrid course-taking in fall 2004, winter 2004, and spring 2005. Table 1.2 shows the descriptive results on term-level variables, which suggest that online courses were consistently more popular among full-time students (those taking 12 or more credits in a quarter), students who had earned prior credits, and students who had previously taken an online course; similar patterns were also observed for hybrid course-taking. In addition, students who were employed more hours in the current term seemed more likely to take an online course. In contrast, no strong differences were apparent among students with different employment statuses with regard to hybrid course-taking.

We also examined variations in online and hybrid course enrollments across the 34 colleges in the system. Figures 1.1 and 1.2 show that the percentage of online and hybrid courses taken by students in the 2004 cohort varied widely across colleges. At the college with the lowest proportion of online enrollments, students enrolled in only 1% of their courses online; at the college with the highest proportion of online enrollments, students enrolled in 21% of their courses online. For hybrid course enrollments, the range was from 0% (for seven colleges) to 13%. While we have no direct information regarding the *availability* of online and hybrid courses at each school, the variation in *enrollment* rates implies that some colleges offer many more online and hybrid courses than do other

[5] Based on Census data regarding the average income in the census block in which the student lives, SBCTC divides students into five quintiles of SES status.

colleges. For example, the state's five technical colleges are clustered at the lower end of Figure 1.1, indicating low online enrollment rates among those institutions. It is not clear, however, whether these colleges' relatively low online enrollments are due to lack of interest in online courses among occupational students, or due to other institutional factors that may limit online course offerings within those colleges.

To examine which demographic characteristics had a statistically significant impact on online and hybrid course-taking in the first term and first year, we conducted an analysis incorporating the student characteristics explored above. In order to control for variation in online course policy, design, or availability across schools, we used multilevel modeling techniques, which take into account the clustering of students within colleges in terms of the probability of online and hybrid enrollment. Results indicate that in terms of both the first quarter and the first year, online courses were significantly[6] more popular among females, English-fluent students, transfer students, students who were dual enrolled before entering college, those who applied and were eligible for financial aid, who never enrolled in remedial education, and who were more than 25 years old at college entry.[7] In terms of ethnicity, Asian, African American, and Hispanic students were significantly less likely to take an online course both in the first quarter and first year than were White students, while American Indians and Pacific Islanders were less likely to take an online course only in the first year. In terms of socioeconomic status, highest-quintile SES students were significantly more likely to take an online course in the first year than were lowest-quintile SES students. In line with the demographic descriptive profile of hybrid course-takers, analysis controlling for student characteristics only identified two indicators that had a significant impact on hybrid course-taking both in the first term and first year: English-fluent students and students who never enrolled in remedial education were significantly more likely to attempt a hybrid course both in their first term and first year.

Observed demographic differences between students who enrolled in an online/hybrid course at some point and those who did not could be due, at least in part, to

[6] Throughout this paper, we use the terms "significant" and "significantly" to denote statistical significance ($p < .05$).

[7] Based on the concern that the observed pattern might be a function of the types of courses that are offered online, we also conducted sub-sample analysis focusing on specific key subjects (English and math), which led to similar findings.

individual variations in college persistence. As shown in Table 1.3, the proportion of students taking online and hybrid courses increased strongly across the first two years of the study, although the increase seemed to flatten in 2006–07.[8] Students who persisted until the second or third year of college would be much more likely to eventually take an online course than would those who dropped out after one or two quarters. To disentangle college persistence from the likelihood of taking an online course, we also conducted analyses of demographic characteristics of online course-takers separately for each subsequent term of enrollment; in general, the same demographic patterns persisted regardless of the timing of online and hybrid course enrollment.

Among students with valid employment information in a given term,[9] we conducted secondary analyses using the same model but added working hours as a predictor of online course and hybrid course-taking during that term. Results indicate that working more hours significantly increased the probability of taking at least one course online in each term; in contrast, working more hours seemed to be negatively related to the probability of attempting a hybrid course in most terms, though the association was only significant for one term[10] among the 19 terms from 2004 to 2009. In terms when each student had a prior GPA and prior credits accumulated from previous terms, we also included prior GPA and prior credits into the models. Neither of the two variables had a consistent impact on either online course enrollment or hybrid course enrollment.

3.2 Patterns of Enrollment Among "Ever-Online" and "Ever-Hybrid" Students

Among students who took an online course at any point across their career at Washington community or technical colleges ("ever-online" students), 38% attempted only one online course, 21% attempted two, 25% took three to five, and 16% took six or more online courses. Among those who took at least one hybrid course ("ever-hybrid" students), 60% took just one, 19% took two, 16% took three to five, and only 5% took six

[8] Although we do not have direct data on course availability across time, it seems likely that increased enrollments are correlated with increased availability.
[9] Students who had no valid Social Security Number (e.g., international students) or those in special employment situations (e.g., self employed) would be subject to a missing value for a given quarter. Students who had a valid SSN but were missing from the employment data for a given quarter were coded as "not working" during that quarter.
[10] Hours of employment was a significantly negative indicator of attempting at least one hybrid course in winter 2006.

or more. However, from these statistics it is unclear whether ever-online or ever-hybrid students took few courses (but most of them online or hybrid), took many courses with a predominately face-to-face mix, or shifted the number and mix of online, hybrid, and face-to-face courses over time. To address these questions, we examined changes in the number and percent of credits taken online or hybrid, as well as the proportion of students taking *all* their credits online or hybrid, for three sets of students: (1) all students, (2) ever-online/ever-hybrid students, and (3) students enrolled in an online course during a given academic year ("actively-online" students) or students enrolled in a hybrid course during a given year ("actively-hybrid" students).[11]

Tables 2.1 and 2.3 present the averages for each statistic for each academic year, separately for each subset of students. Table 2.1 includes all students from the 2004 cohort who were still enrolled during a given academic year. For example, during their first year (2004–2005), the average student took 1.75 credits online (representing 8% of the total credits they attempted that year) and 0.30 credits via a hybrid mode (representing 1% of total credits attempted that year). Table 2.2 narrows the sample to students who ever took an online or hybrid course. Among those students who ever took an online course, in their first year they took 5.29 credits online, which represented 24% of their total credits attempted that year. Among those who ever took a hybrid course, in their first year they took 3.29 credits via a hybrid mode, which represented 11% of their total credits attempted that year. Table 2.3 further narrows the sample to only students who were taking an online or hybrid course in the given year. Figure 2.1 and 2.2 visually presents the trends of online and hybrid course-taking across academic years. In terms of online course enrollments, all three subsets of students followed a general pattern of increase in terms of the average *proportion* of credits taken online over the five years; however, the average *number* of online credits increased sharply across the first year and then leveled off. As for hybrid course enrollments, the *proportion* of hybrid credits taken seemed to increase more strongly in later years. The *number* of hybrid credits increased slightly over all students, fluctuated within a narrow band for students who ever took

[11] Analyses were conducted at the year level, calculating the number and percent of online/hybrid credits for each student actively enrolled in that academic year, then averaging across students within years.

hybrid courses, and increased more strongly in later years for students who were actively taking a hybrid course.

These results, taken together with those in Table 1.3, suggest that the increase in online and hybrid course enrollments from 2004 to 2009 can be separated into two trends: (1) over time, students were increasingly likely to try at least online or hybrid courses, moving themselves into an "online student" and/or "hybrid student" category, with most of this increase occurring within the first two years; and (2) those in the "online student" and "hybrid student" categories only slightly changed the *number* of credits taken online/hybrid in a given academic year, but consistently increased the *proportion* of credits taken online/hybrid. As an illustration, in one academic year, a student may take one online and two face-to-face courses; in the next, she may take only two courses, one online and one face-to-face. Although she has not increased the number of courses taken online, she has increased the proportion.

Finally, Tables 2.1 and 2.3 also provide information regarding the proportion of students who took all their courses online or hybrid in a given academic year. For example, among all students in the 2004 cohort, only 3% took all of their courses online in their first year of enrollment. Across all students, few took an entirely online curriculum in a given year; even fewer took an entirely hybrid curriculum. Even actively-online or actively-hybrid students were unlikely to take *all* credits online/hybrid. Although this proportion increased over time for both actively-online students (from 17% to 32%) and actively-hybrid students (from 2% to 9%), most students who took online or hybrid courses in a given year also participated in face-to-face coursework during that year. Taken together, these results suggest that although students increased their online and hybrid course enrollments over time, most enrolled in online/hybrid courses intermittently or as one course among several other face-to-face courses.

3.3 Course Completion and Subsequent Course Enrollment Outcomes Among Ever-Online/Hybrid Students

This section compares student course performance between online, hybrid, and face-to-face courses. Given the strong demographic differences between ever-online students and those who chose an entirely face-to-face curriculum, analyses in this section

consider only students who took an online or hybrid course at any point. Given that these students took at least one course with a strong online component, we can assume that these students have a stronger propensity for online learning than do students who chose an entirely face-to-face curriculum. By restricting our sample to students who ever took an online or hybrid course, we can compare outcomes between the courses that these students took online or hybrid versus the courses these same students took face to face.

We first focus on course completion, defined as successfully earning any credits in the course (as opposed to withdrawing from or failing the course).[12] Treating the course as the unit of analysis (i.e., examining the 323,528 courses taken by ever-online or ever-hybrid students), 89% of these courses were successfully completed. As shown in Table 3.1, while the overall hybrid completion rates were almost the same as the face-to-face completion rates, online course completion rates were 8 percentage points lower than face-to-face completion rates. As might be expected, course completion rates were slightly lower for developmental students (i.e., those who had ever enrolled in a remedial course). However, the 2 percentage point difference in completion rates between college-ready and developmental students was negligible in comparison to the 8 percentage point difference in completion between online and face-to-face courses. The decrement in performance for online courses was fairly consistent between college-ready and developmental students; both groups had completion rates 7 to 8 points lower in online courses.

We also examined the performance of ever-online and ever-hybrid students enrolled in developmental courses that were offered face-to-face versus online and hybrid. Although only a very small proportion of remedial courses were offered through online education, this still constituted a fairly large pool of online remedial enrollments to examine (English Online N = 358, Math Online N = 1,684) in comparison with face-to-face remedial enrollments. However, only a very small number of developmental courses were offered through the hybrid format (English Hybrid N = 56, Math Hybrid N = 92). Considering only those remedial students who ever participated in online or hybrid

[12] We also did separate analyses on the impacts of course format on course withdrawal, and among those who were retained through the course, on course grade. Results for each of these outcomes were quite similar to those observed with the general "completion" outcome. To simplify the presentation of results, this paper therefore discusses completion only.

education, Table 3.2 shows that the decrement in completion for online courses was even greater in remedial classes, with a 12 percentage point difference in remedial English courses and a 10 percentage point difference in remedial math courses. Completion rates for English hybrid developmental courses were also lower than those of face-to-face courses; however, given the small *N* for hybrid developmental courses, these descriptive patterns should be interpreted with caution.

To examine whether these observed differences are statistically significant after controlling for student characteristics, we ran a series of inferential analyses predicting course completion, focusing particularly on math and English courses.[13] Given the descriptive findings of a wider gap between online and face-to-face courses when the course was remedial, preliminary versions of the models included an interaction between course mode (online versus face-to-face) and an indicator of whether the given course was remedial. The interaction was weak and non-significant; for parsimony and ease of interpretation of other effects, the interaction was dropped from the final models. Although the course mode did not interact with the level of the specific *course*, it is still possible that course mode interacts with the initial preparedness of the *student*. Accordingly, we also investigated interactions between course mode and remedial-enrollment status in each subject.

Two final models were conducted within each subject area. Model 1 included all courses in that subject across the college career (including 37,084 math and 30,958 English courses) among ever-online/hybrid students, controlling for course-level, term-level, and student-level characteristics. Course-level characteristics included the number of credits for which the course counted and whether the course was developmental; term-level characteristics included controls that varied by term, including the student's credit load for the current term, and a time trend reflecting the term in which the course was taken. Student-level characteristics included gender, race, age 25 years or older at college entry, SES quintile, dual-enrolled prior to college entry, transfer-oriented versus occupational program placement, applied for and was eligible for need-based aid, and

[13] In view of the hierarchical structure of the data where students are nested in courses and courses are further nested in colleges, we ran a three-level multilevel model for each subject area, including term-level and student-level characteristics on level 1, course level characteristics on level 2, and primary college affiliation on level 3. For each model, intercepts were allowed to vary randomly at both the course level and the school level.

remedial-enrollment status for math and English. For consistency between the two subject areas' models, each equation also included cross-level interactions between course mode and remedial-enrollment variables for the corresponding subject area.

As a robustness check of Model 1, we also added working hours in a given term (when valid employment information was provided) as a predictor of course completion. Among the subset of students who provided employment information, the coefficients for online learning on math and English course completion remained consistent before and after inclusion of these additional controls. Accordingly, these predictors were dropped, and further analysis proceeded with the full sample of students.

Model 2 built upon Model 1 by adding course-level predictors of the student's GPA and credits earned prior to enrollment in a given course. If a student had no GPA prior to enrolling in a course, that particular course could not be included in Model 2. Accordingly, all fall 2004 courses and a few winter 2004 courses were dropped from Model 2, resulting in 30,629 math courses and 26,093 English courses for analysis. Both prior GPA and credits earned prior to enrollment in the given course were powerful predictors of course completion, and they jointly dampened the coefficients of age, gender, and remedial-enrollment status. However, the pattern of coefficients for course format remained fairly consistent between Model 1 and Model 2.

For both Model 1 and Model 2, the hybrid course coefficient was positive for math courses and negative for English courses, though all the coefficients were weak and non-significant. In contrast, the online course coefficient was consistently negative and significant across all models. For both English and math courses, the interaction between student remedial-enrollment status and course format was not significant for either Model 1 or Model 2. These non-significant interactions indicate that the online versus face-to-face gap is consistent among all students regardless of whether they were underprepared at college entry. As multilevel models with interactions can be challenging to interpret, Figure 3.1 provides a visual display of predicted probabilities from Model 2. The probability of passing a course is presented separately for online and face-to-face courses, moderated by remedial-enrollment status in the given subject. In Figure 3.1, the passing rate in online courses is clearly lower for both subject areas, while the magnitude of the gap seems to be consistent regardless of students' remedial status. These results indicate

that ever-online students who took a math or English course online were less likely to complete the course and that this effect was consistent across both non-remedial and remedial courses (given the lack of interaction for whether the *course* was at the remedial level).

Finally, given that proponents of online learning argue that such courses are improving over time as they incorporate new technology, we further added interactions between year dummies and course delivery method into Model 2 to test the hypothesis that online course completion rates improved over time relative to face-to-face completion rates. For both math and English, the online learning coefficient was significantly less negative in the fifth year of enrollment compared to the first year, indicating that online course completion rates seemed to improve for students who had reached their fifth year of enrollment. For English courses, the negative coefficient in the fifth year, while smaller, was still significant; for math courses, the negative coefficient in the fifth year was almost half of that in the first year and was non-significant.[14] Thus, there was no difference between the completion rates of online and face-to-face math courses among students in their fifth year of enrollment. If these patterns indicated substantive improvements in online courses over the latter half of the decade, then analysis of the 2008 cohort (who entered school during the fifth year of 2004 students' enrollment) should also show small or negligible differences between online and face-to-face completion rates. However, analyses of the 2008 cohort data (see Section 5) show significant negative coefficients for both math and English that are nearly the same strength as those of the 2004 cohort in their first year. That is, for first-year students, the course completion gap between online courses and face-to-face courses did not shrink substantially between 2004 and 2009. Given this, the observed changes of the online course coefficients in the fifth year for the 2004 cohort might be due to two causes. First, the completion rate in online courses might improve as students become more used to the online delivery format. To test this hypothesis, we added an interaction term between the online format variable and a term-level variable indicating the number of credits the student had previously attempted online into Model 2. The coefficient of the interaction

[14] For each subject, we ran Model 2 on a sample restricted to courses taken in the fifth year of enrollment (academic year 2008–09). Though the sample size was much reduced from the original sample, power was still reasonably high with an *N* over 2,000 for each model.

term is significantly positive for both subjects. This suggests that the gap in online course completion narrows significantly as students gain more experience with online courses. A second potential cause of the reduced online course coefficients over time is that students who did poorly in online coursework might subsequently switch to entirely face-to-face coursework, leaving the online courses to those who learn effectively in that context. Additional descriptive analyses indicate that many students indeed made this choice. Among students who took both methods of coursework during the first fall of enrollment, those who did equally well in both types of coursework had a 50% probability of enrolling in an entirely face-to-face curriculum in the winter; in contrast, those who did more poorly in online coursework than face-to-face coursework had a 73% probability of enrolling in entirely face-to-face courses in the winter.

3.4 Subsequent Outcomes for Online Students

Given that completion rates were similar between hybrid and face-to-face courses, it seems unlikely that hybrid course-taking would be associated with students' subsequent outcomes. However, as online completion rates were substantially lower, it is important to examine whether enrolling in online courses in the first term or first year is associated with subsequent educational outcomes, particularly withdrawal from college after the first term or first year,[15] as well as earning an educational award or transferring to a four-year college.

We first examined early dropout from college. Table 4.1 presents descriptive statistics that suggest that students who took at least one online course in the first fall term were more likely to withdraw entirely from their college career in the subsequent term than were those who took only face-to-face courses, a pattern that appears consistent regardless of developmental status.[16] Similarly, among those students who continued to enroll in winter 2004 or spring 2005, those who took online courses in the first year

[15] Students who did not enroll in any courses after fall 2004 during the five-year span of the study are defined as "first-term dropouts." Among students who remained in college after fall 2004, those who did not enroll in any courses after spring 2005 are defined as "first-year dropouts."

[16] For dropout analyses, we used versions of the remedial enrollment and online course enrollment variables that are definitionally independent of future persistence. We defined remedial enrollment as having taken a remedial course prior to or during the current term, and online enrollment as having taken an online course in the current term.

seemed more likely to withdraw from college at the end of the first year than those who did not.

To examine whether this observed pattern was due to taking an online course or to different characteristics of online versus face-to-face takers, we conducted further analysis controlling for student characteristics,[17] using a multilevel model to take into account clustering of students within school. The first model included all students enrolled in fall 2004, comparing dropout rates at the end of the fall term between students who took at least one online course during that time to those who did not. The second model included all students who continued to enroll in winter 2004 or spring 2005, comparing dropout rates at the end of the first year (spring 2005) between those who took at least one online course during the first year to those who did not. Results suggest that students taking at least one online course were significantly more likely to drop out. The model-based predicted probabilities of dropout from fall 2004 were 34% for online students and 26% for face-to-face students; from the first year, they were 20% for online students and 17% for face-to-face students.

Next we examined the long-term outcome of attaining an educational award or transferring to a four-year college. As noted in a previous section, students who were still enrolled in later terms were more likely to participate in online courses; it is thus possible that ever-online students are simply students who had stayed in school longer and thus may have better outcomes. To remove the potential confounding differences between ever-online and never-online students, we used the proportion of credits taken online among ever-online students as a predictor of the probability of award/transfer within five years. Controlling for student characteristics[18] and considering ever-online students who were retained after fall 2004, a multilevel analysis indicated that ever-online students

[17] The models exploring the impact of online course-taking on first-term and first-year dropout include the following baseline variables: gender, ethnicity, over 25 years of age at college entry, type of program (workforce training versus transfer-oriented), financial aid status, SES quintile, credits attempted current term, English fluency, dual enrollment status, ever-remedial status. The model examining first-year dropout also includes students' GPA and accrued credits at the start of winter 2005. We also added students' working hours in the first term and in the first year into the corresponding models as a robustness check and the results were not substantially different.

[18] Gender, ethnicity, over 25 years of age at college entry, type of program (career tech versus transfer), financial aid status, English fluency, SES status, dual enrollment status, ever-remedial status, GPA, and accrued credits at the start of winter 2005. We also added students' working hours in fall 2004 as a robustness check and the results were not substantially different.

who took a higher proportion of credits online were significantly less likely to attain an award or transfer to a four-year college: At the 25th percentile (8% of credits taken online), these students had an estimated 54% probability of award or transfer; at the 75th percentile (33% of credits taken online), the probability of award/transfer was reduced to 50%.[19]

3.5 Additional Analysis for 2008 Cohort

Analysis of the 2004 cohort provides an opportunity to examine students' long-term outcomes. However, these students began school over six years ago; it is possible that online and hybrid patterns and performance have shifted substantially in that time. To explore whether the 2004 results are consistent with those of more recent enrollees, we also examined online and hybrid course-taking for the 2008 cohort. All variables and value definitions were identical between the 2008 and 2004 cohort datasets. In this sample, 34% of students enrolled in either remedial math or English during their first year: 13% in developmental English, and 30% in developmental math.

As with the 2004 cohort, courses with no valid outcomes were dropped from the dataset. Removing these courses also dropped a small proportion (less than 1%) of students, resulting in 57,427 students and 336,879 courses for analysis. For the 2008 cohort of students across their first three terms, 11% of courses were taken online and 4% were taken via a hybrid mode.

Student characteristics. Across their first fall term at a Washington community college, 17% of students in the 2008 cohort attempted at least one online course and 6% at least one hybrid course; in their first year, 28% attempted an online course and 12% a hybrid course. Inferential analyses controlling for baseline characteristics indicate strong demographic differences between students who enrolled in online courses and those who took only face-to-face courses. These differences were consistent with the 2004 cohort in that online courses were significantly more popular among females, White students, English-fluent students, transfer-oriented students, those who applied and were eligible for financial aid, who never enrolled in remedial education, who were dual enrolled prior

[19] Predicted award/transfer probabilities are higher for this subsample than the SBCTC population at large, given that they were ever-online (i.e., more prepared) students who were retained through winter 2005 and who had valid GPAs in that term (i.e., had taken at least one course for a grade).

to college, who were above 25 years old at college entry, and those who worked more hours in a given term. In line with findings regarding 2004 cohort hybrid course-takers, the 2008 cohort analysis indicates that students enrolled in hybrid courses were quite similar to those enrolled in face-to-face courses.

Patterns of online and hybrid enrollment. Among the 2008 cohort students who took at least one course online (*N* = 16,207), 50% took just one online course in their first year, 22% took two, 21% took three to five, and the remaining 7% took six or more. Among those who took at least one hybrid course (*N* = 6,987), 64% took just one, 20% took two, 13% took three to five, and less than 3% took six or more.

Students in the 2008 cohort who were actively online[20] (*N* = 16,207) took an average of 9.81 credits online in their first year, constituting 44% of their total credits that year. In comparison, the 2004 cohort of active online course-takers took 40% of their total credits online in their first year. Thus, students who entered in 2008 were slightly more likely to take online courses than those who entered in 2004. It is unclear whether this difference is due to a slightly stronger preference for online learning among more recent cohorts of students or whether there is simply a higher proportion of online course sections available for newer students to take.

It is interesting to note, however, that this small 4 percentage point increase between the entering 2004 and 2008 cohorts is swamped in comparison to the increase across time in the proportion of credits taken online among the 2004 cohort. (As Table 2.3 indicated, this constituted a 17 percentage point increase from 2004–2005 to 2008–2009). In a similar vein, students in the 2008 cohort who were actively enrolled in hybrid courses (*N* = 6,987) took 26% (an average of 8.3 credits) of their total credits that year through the hybrid format, compared to 23% among their counterparts in the 2004 cohort. This 3 percentage point gap is also smaller compared to the increase within the 2004 cohort (a 14 percentage point increase between year 2004–05 and year 2008–09). That is, while new students are slightly more likely to take advantage of online and hybrid learning than were earlier cohorts of students, at least some of the shift to online learning

[20] Consistent with the definition of "active online students" and "active hybrid" students in the 2004 cohort, we define active online students in the 2008 cohort as those who took at least one online course during their first year in college.

is due to continuing students who shift a larger proportion of their courses to online and hybrid modes.

Course completion. Parallel to the analyses on course completion for the 2004 cohort, we compared course completion rates between online, hybrid, and face-to-face courses for students in the 2008 cohort who took at least one online course or hybrid course during their first year of college. Among the 144,964 courses under analysis, 88% were successfully completed. Similar to the course completion pattern observed in the 2004 cohort, there was a wide gap between the completion rate of face-to-face courses (89%) and online courses (83%); in contrast, the completion rates of hybrid courses (88%) seemed no different from those of face-to-face courses.

Further inferential analyses controlling for baseline variables and focusing particularly on math (N = 22,082) and English courses (N = 21,450) leads to findings similar to those of the 2004 cohort: while the hybrid course coefficients were weak and insignificant, the online course coefficients were strongly[21] and significantly negative across all models for both subjects. This finding suggests that newer students have online course experiences similar to those of students who entered the system several years ago.

4. Results Summary

The data source used in the current study had several advantages. First, the data set tracked students over an extended time frame (five years) and across multiple institutions, capturing within-system transfer behavior as well as periods of stopping out and returning to college. Second, in addition to the most commonly controlled individual baseline variables such as gender, race, and age, the administrative data set also provides information on students' socioeconomic status as well as hours of employment during

[21] Given that the 2008 analysis included only courses taken in the first year and that the type of courses taken by students might change in later years, we compared the 2008 online course coefficients with the 2004 coefficients on courses taken in the first year. The negative coefficients for first-year course completion for the 2008 cohort were slightly attenuated compared to the coefficients for first-year course completion analyses for the 2004 cohort. For example, for first-year math courses under Model 2, the 2004 students were 8.0% less likely to complete an online than a face-to-face course, while 2008 students were 6.1% less likely.

each quarter of enrollment, which enabled us to more precisely control for student baseline characteristics.

Analyses of students who entered Washington community or technical colleges in 2004 indicate that nearly 30% of these students enrolled in an online course and around 6% enrolled in a hybrid course across a five-year span, with online enrollments increasing steadily across time. However, few students enrolled in an entirely online or hybrid curriculum in a given academic year. In general, students with stronger academic preparation were more likely to enroll in online courses. Among students who had valid information on employment in a given term, those who worked more hours were also more likely to take online courses. In contrast, students enrolling in hybrid courses seemed very similar to face-to-face students in terms of baseline characteristics.

Controlling for a variety of student and course-level information, we found that: while students were equally likely to succeed in hybrid courses, students were more likely to fail or withdraw from online courses than from face-to-face courses. This completion gap was consistent for both the 2004 and 2008 cohorts. However, for the 2004 cohort, the gap significantly narrowed by the students' fifth year of enrollment. Follow-up analyses suggest that this narrowed gap may be due to two intertwined factors: (1) students who were initially unsuccessful with online learning were less likely to enroll in online courses in subsequent semesters; and (2) by their fifth year, students in online courses were already familiar and experienced with the online course format.

In addition to a gap between online and face-to-face course completion rates, results suggested that students who took online coursework in early terms were slightly but significantly more likely to drop out of school in subsequent terms; ever-online students who took a higher proportion of their coursework online were also significantly less likely than other ever-online students to eventually earn an educational award or transfer to a four-year school.

Overall, the findings of the current study do not provide strong evidence regarding the effectiveness of hybrid courses: observed patterns of outcomes for hybrid courses were sometimes positive and sometimes negative, were always weak, and were never statistically significant. In contrast, the evidence regarding online courses was fairly clear. We found that students who participated in online courses had lower success

rates on a variety of outcomes, even after controlling for a rich array of student characteristics, including prior academic performance and concurrent hours of employment. This pattern of results is quite similar to that observed across Virginia community colleges (Jaggars & Xu, 2010; Xu & Jaggars, 2010), indicating that student difficulties with online courses in community colleges are not confined to one state.

5. Conclusion and Recommendations

Online learning is an important strategy to improve course access and flexibility. From the student perspective, the convenience of online learning is particularly valuable to adults with multiple responsibilities and highly scheduled lives; thus, online learning can be a boon to workforce development, helping busy adults to return to school and complete additional education that otherwise could not fit into their daily routines. From an institutional perspective, online or hybrid modalities allow colleges to offer additional courses or course sections to their students. A lack of available seats in key introductory courses can pose a barrier to student progression; freedom from the constraint of physical classroom space allows administrators to create as many course sections as they can find qualified instructors for, which may lower the availability barrier. In addition, small colleges do not always have the resources to offer a wide range of courses to their students; shared online courses allow these campuses to offer students a wider variety of courses.[22] Finally, some colleges outside the Washington system have leveraged the flexibility of online learning to redesign the nature of postsecondary education. Western Governors University's entirely-online competency-based programs provide a personalized and flexible education, allowing students to forgo formal courses and potentially accelerate their completion of a degree. The Indiana Wesleyan University College of Adult and Professional Studies uses a cohort model, in which "weekly online classes are organized to begin when cohorts fill" (Auguste, Cota, Jayaram, & Laboissière, 2010, p. 13), a strategy that is thought to contribute to the college's relatively high graduation rate.

[22] Currently 96 courses are offered through the WashingtonOnline shared course system; see http://www.waol.org/info/waolCourses/masterCourseList_n.asp?CourseType=1

Yet the results of this report suggest that online coursework may be more difficult for some students to complete, which in turn could inhibit their academic progression and eventual completion. In a recent review of the online learning literature (Jaggars, 2011), we detail some of the challenges faced by low-income and underprepared students face in online courses, including: technical difficulties, a sense of social distance and isolation, a lack of the "high learner control" that may be needed for success in the relatively unstructured and flexible online environment, and limited availability of online student support services. To help ameliorate these difficulties while still allowing for increased flexibility, some educators advocate the expansion of hybrid coursework, which is thought to provide students with the "best of both worlds." And indeed, in this study, we did not find any consistent or significant differences between hybrid and face-to-face completion rates, suggesting that hybrid courses may pose fewer challenges for students. Unlike online courses, however, hybrid courses do not offer complete freedom from geographic and temporal constraint, and thus do not hold out the same promise for dramatically improved access to postsecondary education. Accordingly, online learning should continue to have an important role in community college education. Perhaps the most important question to consider at this point, then, is: How can online learning be improved in order to reach the same level of student success exhibited by face-to-face learning?

During the period under study, the Washington system had already expended a substantial amount of resources to provide supports for online students and faculty. However, most of these supports are provided on a passive basis, rather than being proactively pushed to students and faculty. In order to improve the effectiveness of these supports, they may need to be integrated more strongly into the everyday life of online students (also see Jaggars, 2011; Karp, 2011; Scott-Clayton, 2011). Below, we discuss each of the system's current supports in turn, and suggest potential directions toward stronger service integration.

5.1 Student Online Readiness Assessment

The system's voluntary online readiness assessment provides students with feedback as to whether an online course is a good option for them. The system may wish

to consider *requiring* students to complete the assessment prior to enrollment in each student's first online course, a strategy that would require adding a student log-in to the assessment. While the requirement of student log-in may seem to be a drawback,[23] it may yield other benefits by allowing the assessment to become more tailored to the individual student. For example:

- The assessment provides students with fairly general advice on each item. For example, a student who indicates that his or her technology skills are "very basic" is told to "Contact your college, they may offer courses to help you build your skills." Instead, the feedback could guide students to specific courses available at the student's own campus in the upcoming semester.
- Similarly, students who score poorly on the assessment are offered the general advice to consider a face-to-face course. Yet according to some studies (Cox, 2006), many students sign up for online courses because they cannot find a face-to-face course to fit their schedule. These students may feel they have no choice but to ignore the assessment's advice. For such students, more specific guidance may be helpful. For example, the assessment could automatically provide instructions on how to schedule an appointment with a course advisor to discuss other course options.
- Students' online readiness assessment scores could be collected and used in two ways. First, students' recent scores could be sent to online course instructors, allowing the instructor to take a more proactive approach to helping a student who is likely to struggle. Second, the system could use aggregate student scores on each assessment item to develop programming and services to address particular areas of difficulty.

5.2 Course Management System Tutorial

The tutorial on how to use the system's online course management system is voluntary; the system may wish to consider requiring completion of the tutorial. The

[23] For example, some students could suspect that the assessment is a high-stakes exam that would bar them from participation in online courses, and may therefore answer questions dishonestly to inflate their scores. To avoid this problem, introductory directions should explicitly make clear that the assessment is not used for that purpose.

requirement could be enforced as a deregistration rule (i.e., the student must successfully complete the tutorial within a certain number of days after registration in their first online course or the course will be automatically dropped). The current tutorial provides instructions but no practice exercises. The system may wish to develop practice exercises that will allow students to demonstrate that they have mastered the tutorial content.

5.3 Online Support Services

SBCTC offers round-the-clock online reference librarian support. In order to familiarize students with this service, it may help to integrate activities that require consultation with a reference librarian into the curriculum of key introductory courses (this is true of both online and face-to-face courses). Most colleges also offer round-the-clock online technical support; as of January 2008, most offer online tutoring, although topics and service hours are limited. To serve the needs of online students, who frequently work on courses during the weekend and evening hours, these services should be expanded. Online instructors should also take care to encourage use of these services.

5.4 Faculty Development Support

Most faculty teaching online courses in the system have already taken a short course focused on the use of the online course management system. In order to substantially improve online pedagogy consistently across the system, however, faculty will need to delve more deeply into issues of online quality and pedagogy. A variety of resources are available for interested faculty including additional pedagogy-oriented courses, Sloan-C workshops, e-learning-focused faculty learning communities, and participation in Quality Matters peer reviews. However, time-constrained faculty are unlikely to participate in such initiatives without strong incentives. Positive incentives could include a course buyout, a new laptop, a small increase in salary for online course instruction for trained faculty, or other benefits. Alternatively, participation in a given course or initiative could be required before an instructor can develop his or her own online course, teach a second online course, or teach an advanced course online.

In addition to integrating student supports more fully into the online student experience and incenting faculty to participate in professional development, the state's community colleges may need to create a systematic approach to improving online *and*

face-to-face course quality. Research on effective organizations clearly indicates that substantial large-scale improvement in any area is unlikely to occur without strong faculty and staff involvement (Jenkins, 2011). In his review of barriers to community college improvement, Jenkins (2011) suggests that efforts to engage faculty in improvement efforts can be thwarted by focusing on student retention and completion, which are measures of *institutional* effectiveness, rather than focusing on student learning, which is a measure of *instructional* effectiveness. To engage faculty in improvement efforts, colleges may need to empower them to establish common learning outcomes and assessments for academic courses and programs. In practice, these learning outcomes often take the form of common course final exams or projects. These course learning outcomes, in turn, can be used as the basis for a peer-review-driven continuous quality improvement process within individual departments and across the institution.

5.5 Resource Investment

To implement many of the recommendations in this report, additional resources are necessary. For example, adding dynamic individual- and college-specific feedback to the student online readiness assessment will require a substantial investment of time, technological expertise, and systems integration. Providing incentives to faculty to participate in wider, deeper, and more sustained professional development will require a creative leveraging of both monetary and non-monetary resources. After an initial investment of planning time and resources, however, most of our recommendations will be relatively inexpensive to maintain across time, and should pay for themselves in terms of improved student success. Moreover, if online enrollments continue to grow at their current rate, these upfront investments are necessary: Without an improvement in online course success, it will become increasingly difficult to improve students' academic progression.

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Appendix A: Tables

Table 1.1
Percentage Online and Hybrid Courses: First Term, First Year, Ever

	Online			Hybrid		
	First Term	First Year	Ever	First Term	First Year	Ever
All Students (*N* = 50,306)	10%	20%	33%	2%	4%	9%
***Gender*[a]**						
Male	8%	16%	28%	2%	4%	9%
Female	12%	24%	39%	2%	5%	10%
Ethnicity						
White	11%	22%	36%	2%	5%	10%
African American	9%	17%	28%	2%	3%	8%
Hispanic	5%	11%	25%	1%	2%	5%
American Indian	9%	17%	29%	2%	3%	7%
Asian	8%	18%	37%	2%	6%	15%
Alaska Native	7%	15%	24%	4%	6%	7%
Native Hawaiian	9%	17%	29%	2%	5%	10%
Pacific Islander	5%	8%	18%	1%	5%	13%
Multiracial	14%	25%	42%	2%	6%	12%
Other race	12%	22%	39%	3%	5%	12%
Unknown	8%	11%	17%	1%	2%	5%
Age (under/over 25 at college entry)						
Under 25	9%	21%	38%	2%	5%	11%
25 or older	12%	17%	25%	2%	3%	6%
Type of Program						
Workforce Training	8%	14%	22%	2%	4%	7%
Transfer	13%	27%	46%	2%	5%	12%
Financial Aid Status						
Not applied or not eligible	10%	17%	27%	1%	3%	7%
Applied and eligible for need-based aid	11%	25%	44%	3%	6%	13%
SES						
Highest	12%	22%	37%	2%	4%	10%
Higher	11%	21%	36%	2%	5%	10%
Middle	10%	20%	35%	2%	5%	10%
Lower	10%	19%	34%	2%	5%	10%
Lowest	9%	18%	31%	2%	4%	9%
Unknown	10%	16%	25%	1%	3%	6%
Remedial Enrollment - English						
Did not enroll reading/writing dev ed	11%	20%	32%	2%	4%	9%
Ever enrolled reading/writing dev ed	6%	18%	41%	1%	4%	13%
Remedial Enrollment - Math						
Did not enroll math dev ed	11%	18%	25%	2%	4%	7%
Ever enrolled math dev ed	9%	23%	47%	2%	6%	14%
English Proficiency						
Fluent English	11%	20%	34%	2%	4%	9%
Limited English	<1%	1%	6%	<1%	1%	4%
Dual Enrollment Status						
Not dual enrolled	10%	19%	32%	2%	4%	9%
Dual enrolled prior to entry	14%	31%	51%	3%	7%	14%

[a]Only students with valid gender information, *N* = 48,896.

Table 1.2
Percentage of Students Enrolled in Online and Hybrid Courses in the First Year

	Online			Hybrid		
	Fall 2004	Winter 2004	Spring 2005	Fall 2004	Winter 2004	Spring 2005
All Students	11%	14%	16%	2%	3%	3%
Full-time Status						
Part-time student	10%	12%	13%	1%	2%	2%
Full-time student	11%	15%	17%	3%	4%	4%
Previous Course Taking						
No prior credits earned	11%	5%	4%	2%	1%	1%
Earned prior credits	NA	14%	16%	NA	3%	3%
Prior Online/Hybrid Course Experience						
No prior course of this type	NA	9%	10%	NA	2%	2%
Took prior course of this type	NA	57%	48%	NA	29%	22%
Employment Status[a]						
Not working	11%	14%	15%	2%	3%	3%
Working less than part-time	9%	13%	15%	2%	3%	3%
Working part-time	13%	16%	18%	2%	3%	3%
Working full-time	14%	17%	19%	1%	3%	2%

Note. Fall 2004 *N* = 50,265; winter 2004 *N* = 32,162; spring 2005 *N* = 26,902.

[a]Only students with valid employment information, fall 2004 *N* = 45,658; winter 2004 *N* = 30,505; spring 2005 *N* = 25,599

Table 1.3
Percentage of Enrolled Students Taking Any Credits Online/Hybrid

	***N* Enrolled**	**Percent Taking *Any* Credits Online**	**Percent Taking *Any* Credits Hybrid**
Year 2004–2005	50,102	20%	4%
Year 2005–2006	23,489	30%	7%
Year 2006–2007	13,220	34%	8%
Year 2007–2008	7,476	34%	8%
Year 2008–2009	4,881	34%	9%

Table 2.1
Average Number and Percent of Credits Taken Online and Hybrid, Among All Students in Each Academic Year Enrolled

	N Enrolled	Number Credits Taken Online	Percent Credits Taken Online	Percent Taking *All* Credits Online
Year 2004–2005	50,102	1.75	8%	3%
Year 2005–2006	23,489	3.15	12%	4%
Year 2006–2007	13,220	3.29	16%	7%
Year 2007–2008	7,476	3.12	18%	9%
Year 2008–2009	4,881	3.16	19%	11%

	N Enrolled	Number Credits Taken Hybrid	Percent Credits Taken Hybrid	Percent Taking *All* Credits Hybrid
Year 2004–2005	50,102	0.30	1%	<1%
Year 2005–2006	23,489	0.56	2%	<1%
Year 2006–2007	13,220	0.56	2%	<1%
Year 2007–2008	7,476	0.67	3%	1%
Year 2008–2009	4,881	0.79	3%	1%

Table 2.2
Average Number and Percent of Credits Taken Online and Hybrid, Among Ever-Online/Ever-Hybrid Students in Each Academic Year Enrolled

	N Enrolled	Number Credits Taken Online	Percent Credits Taken Online	Percent Taking *All* Credits Online
Year 2004–2005	16,596	5.29	24%	10%
Year 2005–2006	11,481	6.46	24%	8%
Year 2006–2007	7,354	5.91	28%	12%
Year 2007–2008	4,252	5.49	32%	16%
Year 2008–2009	2,712	5.69	34%	20%

	N Enrolled	Number Credits Taken Hybrid	Percent Credits Taken Hybrid	Percent Taking *All* Credits Hybrid
Year 2004–2005	4,607	3.29	11%	1%
Year 2005–2006	3,607	3.62	11%	1%
Year 2006–2007	2,504	2.96	11%	2%
Year 2007–2008	1,604	3.13	13%	2%
Year 2008–2009	1,031	3.75	16%	4%

Table 2.3
Average Number and Percent of Credits Taken Online and Hybrid, Among Actively-Online/-Hybrid Students in Each Academic Year Enrolled

	N Enrolled	Number Credits Taken Online	Percent Credits Taken Online	Percent Taking *All* Credits Online
Year 2004–2005	9,851	8.90	40%	17%
Year 2005–2006	7,381	10.05	37%	12%
Year 2006–2007	4,535	9.58	46%	19%
Year 2007–2008	2,541	9.19	54%	26%
Year 2008–2009	1,636	9.44	57%	32%

	N Enrolled	Number Credits Taken Hybrid	Percent Credits Taken Hybrid	Percent Taking *All* Credits Hybrid
Year 2004–2005	2,183	6.99	23%	2%
Year 2005–2006	1,712	7.63	22%	2%
Year 2006–2007	1,019	7.26	28%	5%
Year 2007–2008	619	8.10	33%	6%
Year 2008–2009	445	8.68	37%	9%

Table 3.1
Percentage Completions in Face-to-Face Versus Online/Hybrid Courses, Among Ever-Online/Hybrid Students' Courses

	Face-to-Face	Online	Hybrid	Overall
Courses (*N* = 323,528)	90%	82%	89%	89%
Student English Status				
No remedial English	90%	83%	90%	89%
Ever took remedial English	88%	80%	85%	87%
Student Math Status				
No remedial math	90%	82%	90%	89%
Ever took remedial math	90%	82%	88%	88%

Table 3.2
Percentage Completions in Face-to-Face Versus Online/Hybrid Courses, Among Ever-Online/Hybrid Students' English/Math Developmental Courses

	Face-to-Face	Online	Hybrid	Overall
Courses (*N* = 28,590)	85%	74%	83%	84%
English	91%	79%	79%	90%
Math	83%	73%	86%	83%

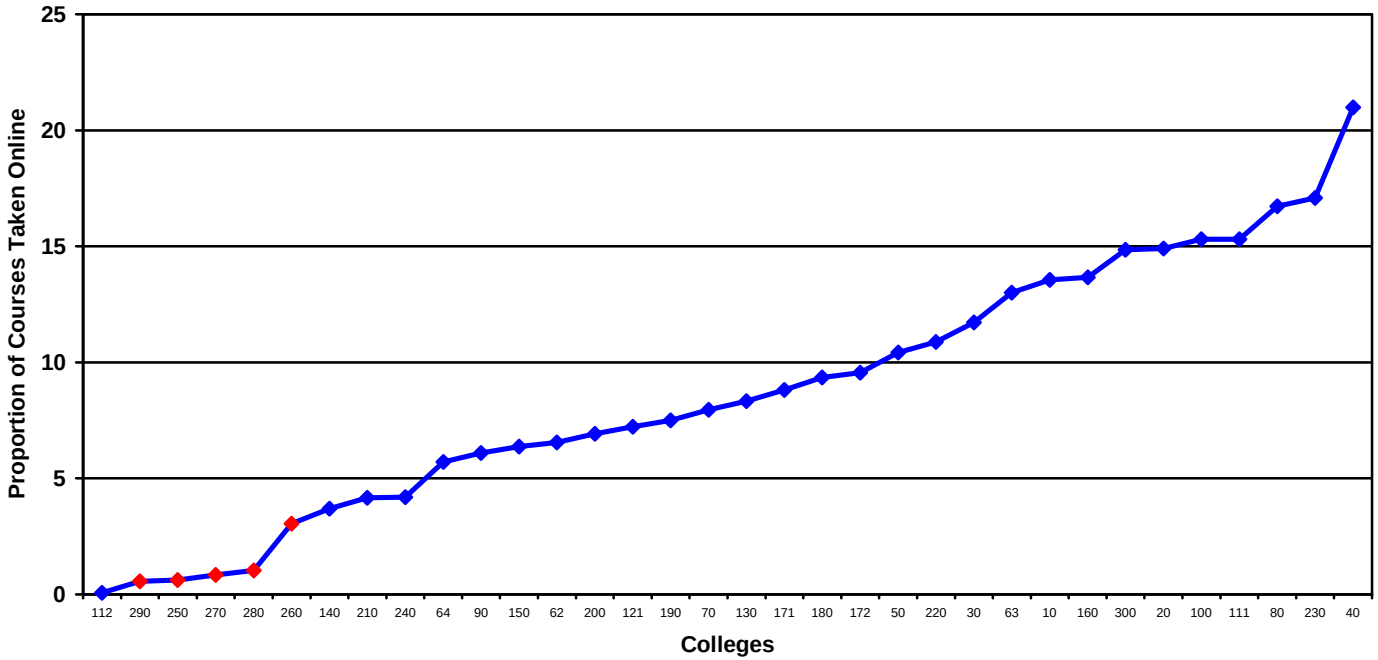
Table 4.1
Percentage Students Dropping Out of School in Early Career, Among All Students

	Dropped Out after the First Term Took Online Course in the First Term (Fall 2004)		Dropped Out after the First Year Took Online Course in the First Year (2004–2005)	
	No[a]	Yes[b]	No[c]	Yes[d]
All Students	28%	32%	16%	19%
Student English Status				
No remedial English	30%	33%	16%	20%
Took remedial English	17%	21%	17%	18%
Student Math Status				
No remedial math	31%	35%	16%	20%
Took remedial math	16%	20%	16%	19%

[a]N = 40,957; [b]N = 4,689; [c]Among students who retained after the first term N = 25,672; [d]N = 7,005

Appendix B: Figures

Figure 1.1
Percentage of Courses Taken Online in Each College



Note. Technical colleges are highlighted in red in both Figures 1.1 and 1.2

Figure 1.2
Percentage of Courses Taken Via Hybrid Mode in Each College

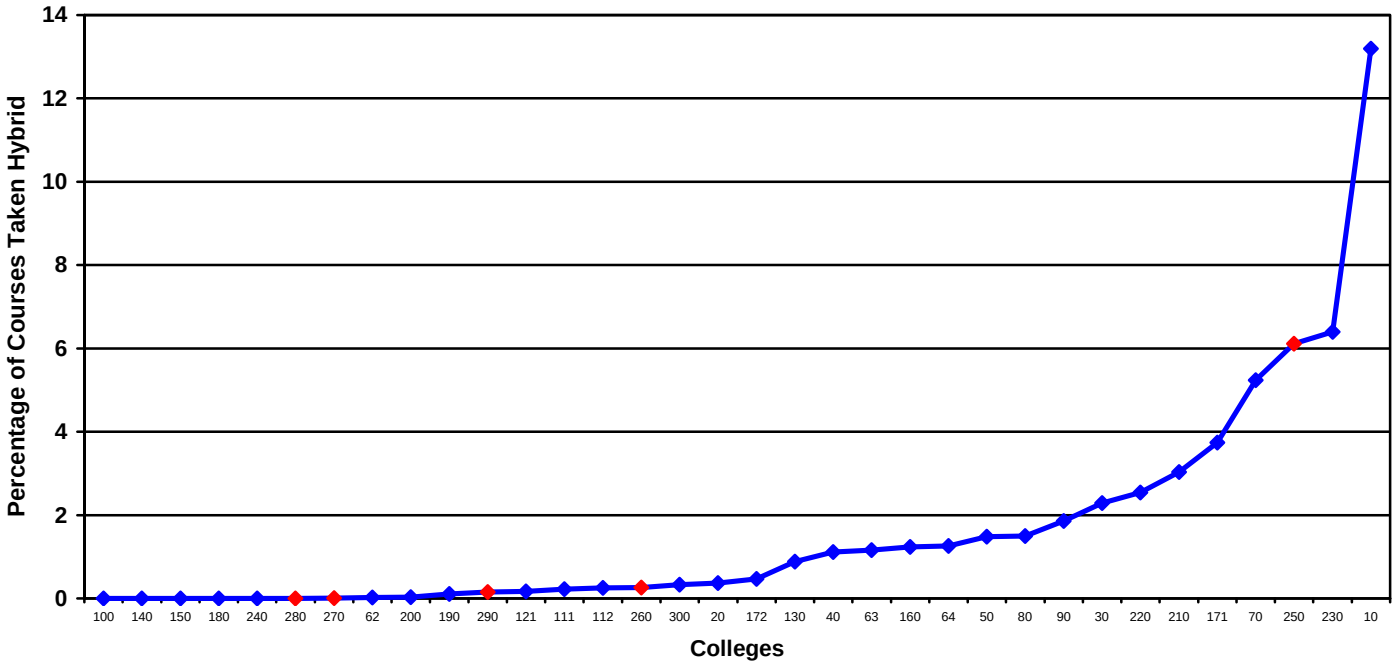


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Figure 2.1
Average Number and Percent of Credits Taken Online Among All Students, Ever-Online Students, and Actively-Online Students, in Each Year Enrolled

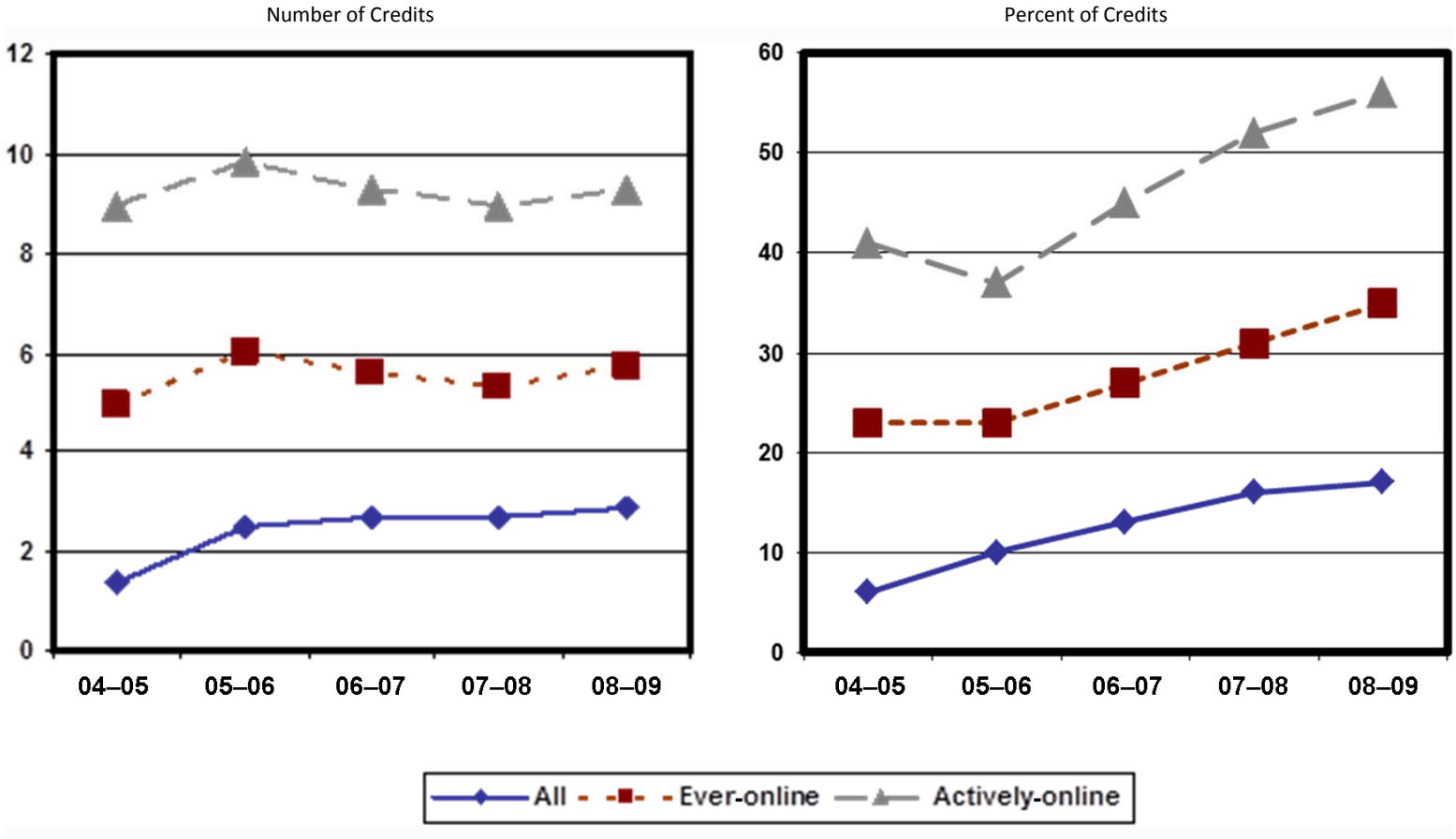

Figure 2.1
Average Number and Percent of Credits Taken Hybrid Among All Students, Ever-Hybrid Students, and Actively-Hybrid Students, in Each Year Enrolled

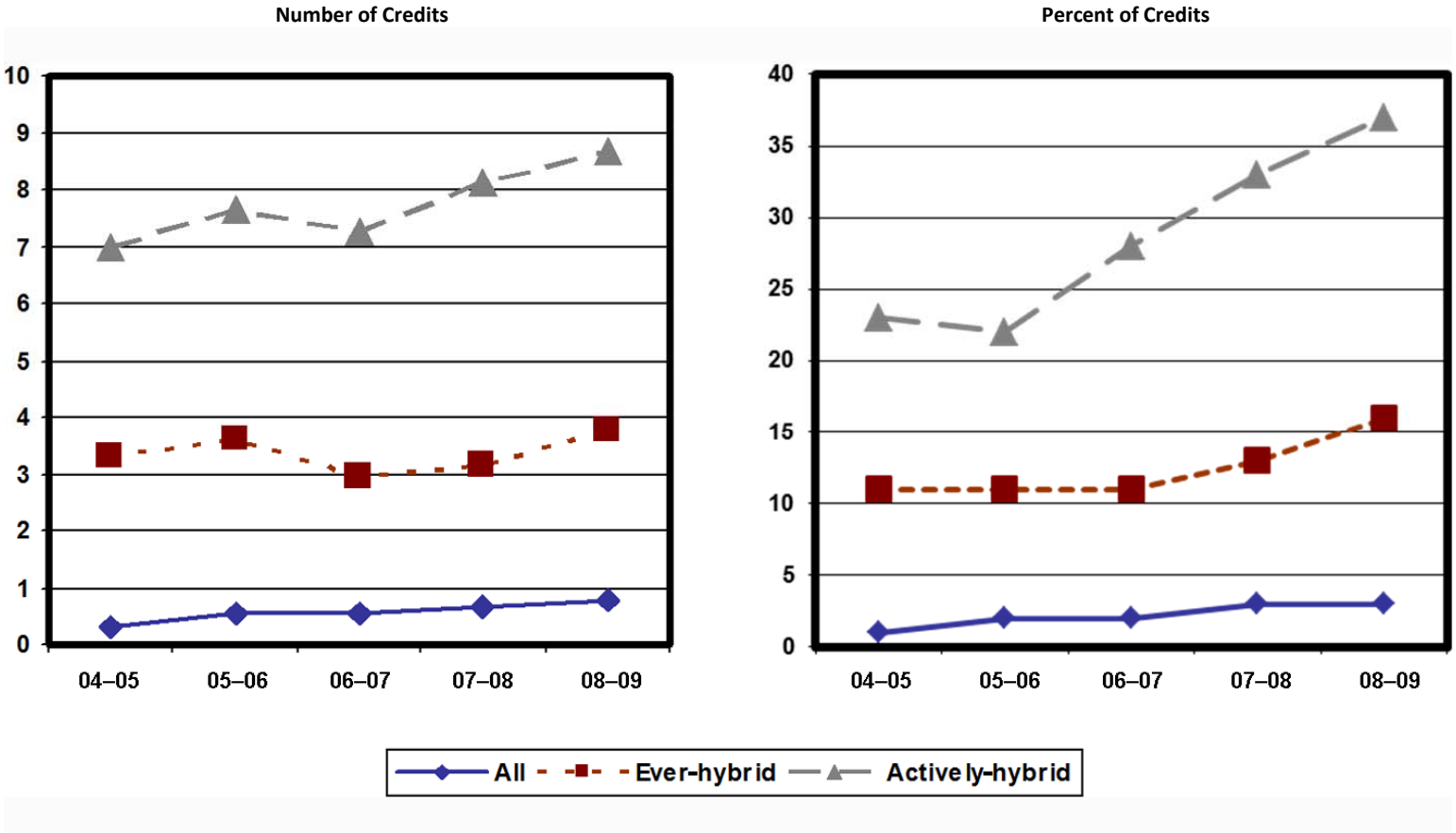

Figure 3.1
Predicted Probabilities of Passing Online and Face-to-Face Courses