

Successful Online Courses in California's Community Colleges



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SUMMARY

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Online learning is growing rapidly in higher education. In California, the state's community colleges have taken the lead, offering thousands of online courses to hundreds of thousands of students. The popularity of online learning is easy to understand. It offers students a convenient way to take college courses when they want, where they want. It gives instructors new pedagogical tools and new ways to track student performance. College administrators see online education as a channel for reaching more students, allowing for increased enrollment without having to add classroom space. For California policymakers, online learning could potentially boost educational outcomes while trimming the costs of higher education.

Yet online learning as currently practiced has critical drawbacks. Most online experts do not anticipate much if any cost savings. More important, online learning has not achieved the educational results of traditional face-to-face classroom learning. Students are less likely to pass an online course than a traditional course. Furthermore, the success rates of African American and Hispanic students are significantly lower than the success rates of white and Asian students. Closing these gaps is essential if online learning is to reach its full potential.

This report identifies successful online courses in California's community colleges. We define an online course as highly successful if at least 70 percent of its students earn a passing grade, and if student performance is at least as good as in traditional versions of the same course. Another key element in our definition of course success is whether students in an online course continue to do well in subsequent courses (either online or traditional) in the same subject. By all these standards, only about 11 percent of online courses in the 2013–14 academic year were highly successful.

What is it that makes a few online courses successful when most are not? We find that online course development in California's community colleges currently depends primarily on an individual instructor who designs the course, creates the online content, and teaches the course—a paradigm we call the individual model of online course development. Some dedicated instructors have exploited the online medium to create successful online courses. Too frequently, however, the instructor simply tries to create an online version of a traditional course, taking little account of the differences in learning environments. This has been the dominant online learning model in California, and the result is a piecemeal approach that lacks consistent standards.

Our research suggests that a more data-driven, integrated, and systematic approach is needed to improve online learning. It is critical to move away from the isolated, faculty-driven model toward a more systematic approach that supports faculty with course development and course delivery. A systematic approach better ensures quality by creating teams of experts with a range of skills that a single instructor is unlikely to have completely.

At the same time, a trend toward centralization and standardization of online learning in the California community college system holds the promise of closing the success gap with traditional classroom instruction. The community college system's Online Education Initiative (OEI) is building a statewide standard education portal that will make online courses available systemwide. The initiative is also developing an infrastructure to train faculty and to support students throughout the system. In order to be successful, OEI's efforts to improve online learning must be supported with sufficient resources and powers of persuasion.

Online learning has been promoted as a way to improve the quality of higher education while lowering its costs. Yet it is far from clear that online instruction will prove to be cheaper. The expense of developing and maintaining online programs could offset savings from reduced use of campus facilities. But cost savings are not the only reason to build the online learning capability of California's community colleges. Online education is essential to increasing access to higher education. California's future depends on an educated population, and online learning has a vital part to play in achieving that goal.

Introduction

Online learning is growing rapidly in higher education. In California, community colleges have taken the lead, offering thousands of online courses to hundreds of thousands of students. Total online course enrollment reached about one million in 2013–14. Online learning seemingly offers something for everyone. For students, it is a convenient way to take college courses. For faculty, it offers new pedagogical tools that could improve student results. For college administrators, it allows their institutions to reach more students, providing a new source of enrollment. For policy-makers, it holds the promise of reducing the costs of higher education.

But online learning has detractors and some clear disadvantages. Paramount among them is that students, on average, are less successful in online courses than in traditional courses in which students and teachers interact face-to-face. In California's community colleges, students are about 10 to 14 percentage points less likely to complete an online course successfully than a traditional course, even when differences in student characteristics and other factors are taken into account (Johnson and Cuellar-Mejia 2014).¹ The results are worse for ethnic and racial minorities. African American and Hispanic students have respectively 17.5 and 9.8 percentage points lower online-course success rates than white students (Johnson and Cuellar-Mejia 2014). Overall, only about 60 percent of community college students enrolled in online courses successfully complete them.

The achievement gap between online and traditional face-to-face courses must be narrowed or closed if online learning is to reach its full potential. Eliminating this gap is an important goal of the Online Education Initiative (OEI), a California Community College Chancellor's Office (CCCCO) program to centralize online course application, registration, and administration. One way to close the gap is to identify best practices from successful online courses and scale up.

In addition, the goal of lower costs seems elusive. Most online course experts do not anticipate savings in the short run because of start-up costs. Even in the long run, savings might not be achieved due to higher costs as courses are updated and technology is upgraded.

This report examines what practices make online courses successful in California’s community colleges. Our goal is to improve understanding of what works and what does not work in online learning. The first section uses CCCCO data to determine how successful online courses have been. The second section discusses best practices in online learning, based on academic research and our interviews with faculty, administrators, and others. The third section looks at emerging technologies that are improving online-course success rates by taking advantage of the online environment and providing tools not available in traditional learning. The report then considers the OEI’s strengths, weaknesses, and potential. Finally, we offer recommendations for advancing online learning in California as a way to make higher education more accessible and more effective.

How Many Online Courses Are Successful?

There is no standard way of defining a successful online course. Our approach uses empirical data to identify courses in which students seemed to excel. Specifically, we look at student outcomes to identify successful online courses, relying on two primary criteria: course passage rates and student performance in subsequent courses in the same subject. By our definition, to be successful, online courses must have a higher share of students with passing grades than in traditional versions of the course. In addition, students must have high rates of completing and passing courses they take later in the same subject.

Our logic is straightforward. We start with the premise that a successful course is one that maximizes student learning. The best and most direct measure of learning is whether a student completes a course with a passing grade. Moreover, how well a student does in subsequent courses in the same subject depends partly on how much the student learned in previous courses in the subject. Subsequent performance also guards against rewarding grade inflation in the original online course. We use statistical models to adjust our estimates of course success rates to take into account factors that are beyond the control of the instructor, such as concentrations of high-performing students and ease of subject matter.²

For every course in our sample, we calculate the share of students who completed the course with a passing grade, and we evaluate online student performance in subsequent courses in the same subject area. We calculate course passage rates for both traditional and online courses, making the statistical adjustments described above. We deem as highly successful the online courses that had at least 70 percent passage rates,³ and in which the passage rates were equal to or higher than those in traditional versions of the course. Furthermore, students in courses with high passage rates must have had good results in subsequent courses in the same subject. We restrict our sample to lower-division transferable courses taught both online and face-to-face, and we require that enrollments exceeded 25 students in each version of the course.⁴



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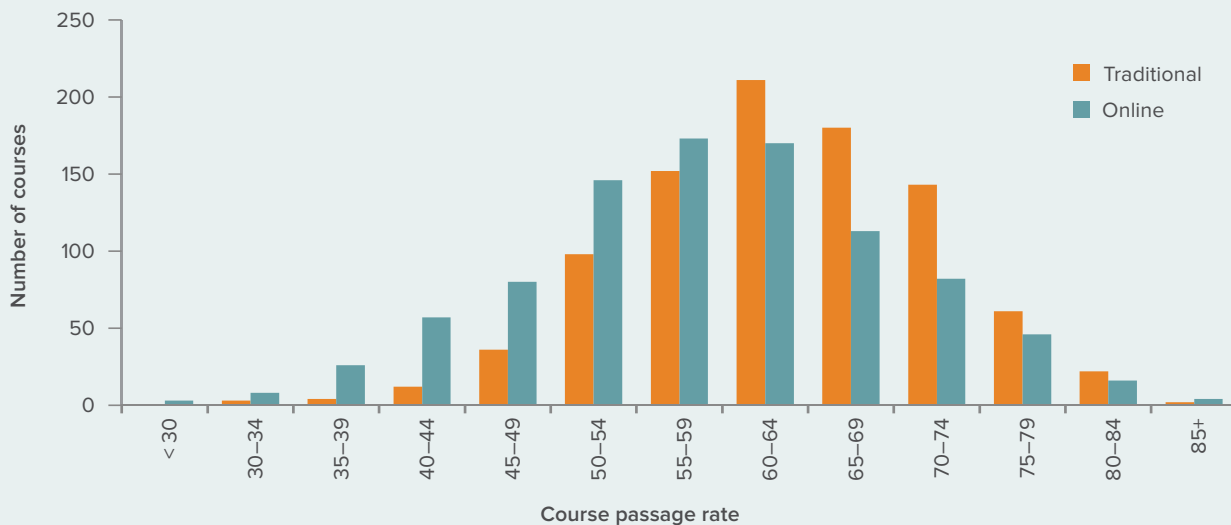
Online learning is growing rapidly in higher education. California community colleges offer thousands of online courses to hundreds of thousands of students.

Most online courses did not meet our definition of success. For example, only 16 percent of online courses in our sample had passage rates of 70 percent or higher, compared with 44 percent of traditional courses (Figure 1). The median passage rate was about 10 percentage points higher for traditional courses (69%) than for online courses (59%). The difference in passage rates reflected more failing grades and more incompletions in online courses than in traditional courses.⁵ The differences persist even when we adjust for student mix, college, subject, and term (see Technical Appendix A for details).

Another component of our definition of success is that passage rates in a course’s online version must have been at least as high as in the traditional version, after adjusting for factors such as differences in student mix. Figure 2 compares online versions of courses directly with their traditional counterparts. It shows that the large majority of online courses had lower passage rates (i.e., many more courses are below rather than above the diagonal). In our sample, just 26 percent of online courses had passage rates at least as high as their traditional counterparts. Online course success rates were at least 10 percentage points higher than traditional success rates in only 24 of 924 online courses. Furthermore, in 439 online courses, success rates were at least 10 percentage points lower than in traditional courses. Among online courses with higher success rates than their traditional counterparts, about two-thirds had course passage rates of greater than 70 percent. Thus, just 16 percent of online courses in 2013–14 had both higher passage rates than their traditional counterparts and at least a 70 percent passage rate.

When we consider whether student online course success continued into other courses (either online or face-to-face) in the same subject, our estimates of the number of successful online courses fall. We measure subsequent performance by examining grades in courses in the same

Figure 1. Traditional courses had higher passage rates than online courses



SOURCE: Authors' analysis based on California Community College Chancellor's Office data.

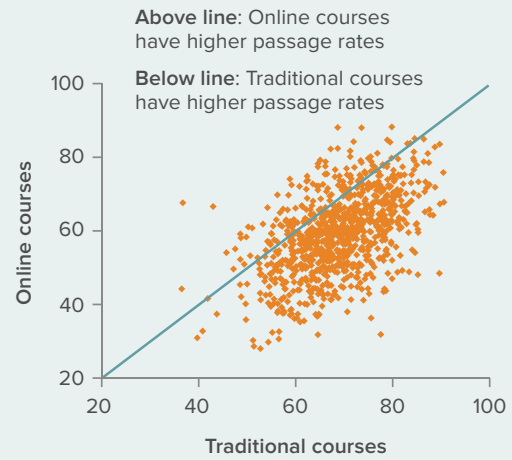
NOTE: 2010–2014 courses offered both online and face-to-face in the same college and with at least 250 enrollments in both. Courses must have been offered for at least three terms online and traditionally. See Technical Appendix A for details.

subject taken after the online course. Figure 3 shows that most online students earned the same grade or better in subsequent courses in the same subject, partly a consequence of relatively low grades in online courses, but also suggesting that knowledge gained in the online course served them well. Indeed, students who moved from online to traditional courses had substantially better grades than students who made other transitions (e.g., from traditional to online courses).

In the final analysis, we find that only 11 percent of online courses were successful. In other words, only about one in nine online courses had a high passage rate, student results at least as good as in the equivalent traditional course, and students who did well in subsequent courses in the same subject.

What explains why relatively few online courses were successful, while most others were not? Our statistical models do not help us to detect a pattern in online course success. Success in course sections varied substantially within colleges, subjects, and courses, even after we adjust for student mix and other factors.

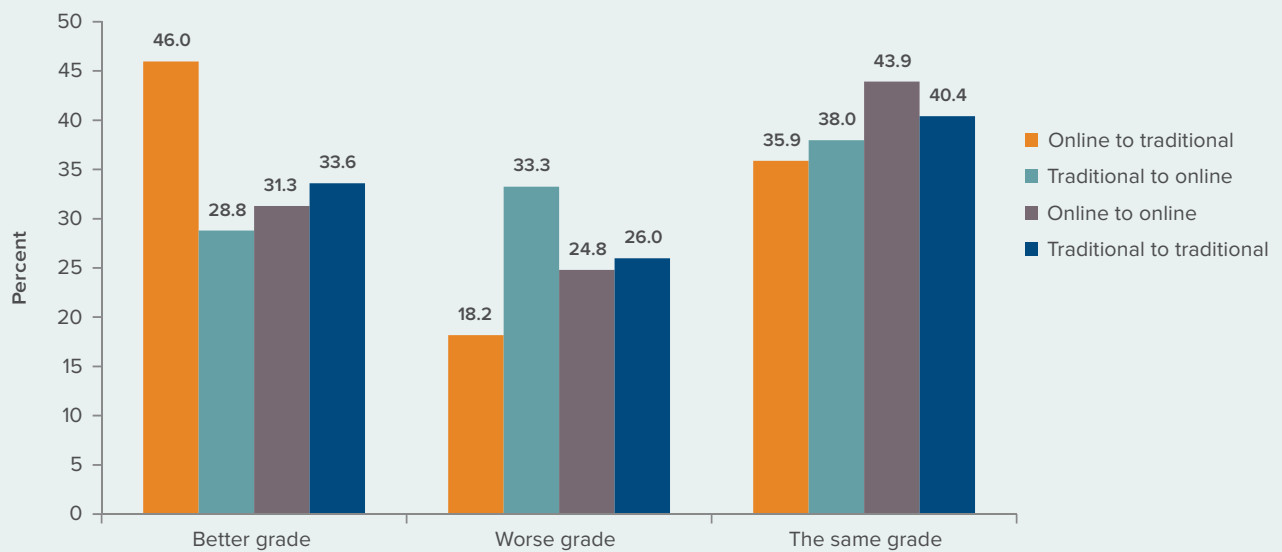
Figure 2. Online courses tend to have lower passage rates than traditional courses



SOURCE: Authors' analysis based on California Community College Chancellor's Office data.

NOTE: 2010–2014 courses offered both online and face-to-face in the same college and with at least 250 enrollments in both. Courses must have been offered for at least three terms online and traditionally. See Technical Appendix A for details.

Figure 3. Online students perform relatively well in subsequent courses



SOURCE: Authors' calculations based on the analytic sample.

NOTE: Online courses in 2013–14. Bars show the percentage distribution of grades in subsequent courses in the same subject area. See Technical Appendix A for details.

For example, among the most common online courses, the share in which at least 70 percent of students earned a passing grade ranged tremendously (Table 1). This wide variation in these highly popular courses defies easy categorization. For instance, accounting courses were among both the highest and lowest performing in California community colleges. Accounting 120 (Managerial Accounting) was offered 42 times in 2013–14. In the vast majority of those courses, students did well. In contrast, Accounting 110 (Financial Accounting) was offered 66 times, but students did very poorly.

This dispersion suggests that the factors determining online course success occurred neither at the college level, the subject level, nor at the course level.⁶ Instead, success was determined in individual course sections. Design and delivery of online education in California’s community colleges is idiosyncratic, depending primarily on the initiative of individual faculty members operating within the constraints and resources of their departments and colleges. Thus, it is not surprising that successful online offerings occurred in a range of colleges, subjects, and courses. Nevertheless, this does not mean we cannot identify best practices or systematic ways to improve online learning. Instead, the dispersion indicates that, so far, California’s community colleges, and even departments within colleges, have not systematically adopted best practices for online courses.

This point becomes clearer when we examine the length of time online courses were offered. Courses newly offered online in 2013–14 had higher passage rates than older online courses. Table 2 shows that the newest online courses in the 2013–14 academic year had passage rates of 66 percent, while courses that had been offered online for many terms had passage rates below 60 percent. Moreover, the passage rate gap between online and traditional courses was substantially lower for new online courses. Such newly offered online courses had passage rates only about 5 percent lower than the rates of traditional courses, a narrower gap than the 10 percent overall difference in passage rates between online and traditional courses. This suggests that instructors who have developed new online courses have increasingly taken advantage of best practices in online learning.⁷ It also suggests, to improve student results, courses taught online for many terms should be updated.

Table 1. The share of online courses with high passage rates varies widely

	Courses with high passage rates (%)	Number of times offered online
Accounting 120	76.2	42
English 105	61.4	70
Psychology 180	60.9	46
Economics 201	60.9	46
Economics 202	48.3	58
Sociology 110	34.8	112
Child Development 100	31.9	72
Business 110	22.1	68
Psychology 110	21.9	128
English 100	20.6	102
Accounting 110	13.6	66

SOURCE: Authors’ calculations based on the analytic sample.

NOTE: Online courses in 2013–14. High passage rate courses are those in which 70% of students earn a grade of C- or higher. See Technical Appendix A for details.

Table 2. Students are more likely to pass new online courses than old ones

Number of terms offered online	Observed passage rate (%)	Number of courses
2	66.2	36
3	64.0	36
4	63.1	54
5	63.1	72
6	63.2	98
7	61.1	46
8	61.6	112
9	61.4	136
10	59.3	422
11	59.0	170
12	57.9	144
13	59.1	104
14	59.7	156
15+	58.8	84

SOURCE: Authors’ calculations based on the analytic sample.

NOTE: Online courses in 2013–14.

In summary, we conclude that the success of online courses in California’s community colleges has depended on the trial and error of individual instructors and others who help develop and present the courses. This hit-or-miss approach indicates that best practices have not been systematically implemented in California’s community colleges. Instead, it has been left to those on higher education’s front line—the instructors—to discover and follow the best practices for administering online courses.

What Makes an Online Course Successful?

Online learning is a new medium based on emerging technology. It is not surprising that it confronts educators with new pedagogical issues surrounding course content design, delivery, and assessment. In this section, we identify the key elements of a successful online course, based on an extensive review of academic literature, and interviews with eight online-education specialists in the community college system, including faculty and distance-education coordinators. This research allowed us to identify best practices in four essential areas of online learning: course design, faculty support and development, student orientation and expectations, and online course interaction.

Course Design

Course design and development is arguably the least developed aspect of online learning pedagogy. The process is usually more extensive and time consuming for online courses than for traditional classroom-based teaching (Liu, et al. 2005). Online course development currently has two distinct methodologies: the individual model and the systems model (Kampov-Polevoi 2010).

The individual model is rooted in the academic tradition of giving faculty members substantial autonomy in course development. It offers greater flexibility and speed, but requires an instructor to take on the roles of subject matter expert, course designer, media developer, and—sometimes—programmer. The instructor is also the course advocate in the process of gaining distance-education course approval. Under the individual model, online course development typically does not start from scratch. Instead, faculty members design and develop courses based on what has worked for them in traditional classrooms. Learning materials from these classrooms are repurposed for online use. For a course to succeed, the instructor must know how to use the online platform effectively, and traditional course content must be adaptable to the new medium (Hawkes and Coldeway 2002).

One distance-education coordinator we interviewed noted that community college instructors who developed a course online in the early years of this technology needed to spend nearly 100 hours of unpaid time to upload course content. They typically received little, if any, training and support during the process. Instructors frequently use traditional face-to-face course materials without proper implementation of online pedagogical principles or an understanding of the technology. Too often, the result is a course with ill-structured design (Powers and Mitchel 1997).

For a course to succeed, the instructor must know how to use the online platform effectively, and traditional course content must be adaptable to the new medium.

Why do most California community colleges use this flawed model to develop online learning courses? Most lack centralized planning, funding, and expertise in online course development. By default, responsibility falls primarily on the shoulders of faculty members. In addition, faculty collective-bargaining agreements and federal- and state-legal requirements may force community colleges to rely on instructors to design courses. Distance-education coordinators can help support faculty, but in our interviews, we found that they generally play a limited role.

In contrast, the systems model can better maximize the potential of the online medium. In this model, teams develop courses. An instructional designer takes the lead managerial role. The faculty member, acting as a subject expert, collaborates with a media developer, programmer, and instructional designer. The model's main advantage is the access to a variety of skills that no single person is likely to have (Oblinger and Hawkins 2006). The combination of project management practices and instructional design theory leads to greater course consistency and quality (Chapman and Nocolet 2003).

While the systems model is widely believed to deliver higher-quality online learning, it requires a large budget, institutional support, dedicated personnel, and technology resources not generally available in the California community college system. The online experts we interviewed generally agreed that course development using a systems approach yields higher-quality online courses. The individual model became the primary online course development method in California's community colleges organically as they sought to meet student demand for online instruction without the necessary funding, organizational structure, design expertise, and leadership. Nonetheless, increasing funding and building institutional capacity may not be enough to ensure successful online course development. Quality online programs require partnerships between technical and administrative personnel, instructional designers and faculty, and decisionmakers with the authority to allocate financial and human resources (Vasser 2010).

Faculty Support and Development

Academic literature and the online learning professionals we interviewed stressed that faculty members must receive appropriate training and ongoing professional development for online courses to succeed.⁸ Organizational support, mentorship, and effective training are significant factors determining whether faculty members successfully employ new technological tools (van Braak 2001; Chiero 1997; Choudrie and Dwivedi 2005; Cushman and Klecun 2006; Frank et al. 2004). Faculty members cannot effectively integrate technology into their teaching if they do not possess the requisite skills.

Instructors in the community college system's most successful online courses, identified through our data analysis, agreed on the importance of training, mentoring, and continuing faculty development in the online medium. The online instructors stressed that the significant differences in pedagogical practices between face-to-face and online courses demands effective faculty training to maximize the potential of the online learning environment. For example, facilitating discussion in a virtual environment, such as a chat room or discussion board, is very different from doing so in a traditional classroom. The usual social, visual, and auditory cues may be absent in the online environment. A different set of rules and norms apply.

Both distance-education coordinators and instructors emphasized the importance of mentoring. They noted that even experienced face-to-face instructors, who may have been teaching at the community college level for decades, often compared their first year of teaching online to their first year of classroom instruction. A formal mentoring program provides a forum in which new online teachers can get answers to questions, share institutional knowledge, and develop the sense of community that online instructors often lack.

Student Orientation and Expectations

Students need additional support in the online learning environment. In online courses, students often struggle with the high level of autonomy and time-management requirements (Brophy 1999). Furthermore, students vary considerably in their comfort and experience with online learning. Many of them thrive with the freedom the online medium provides, but others dither and become confused and apathetic (Lawless and Kulikowich 1996). Managing the learning and logistical demands that come with the freedom of online instruction is a key factor in success.

Setting expectations and preparing students to make the best possible use of online learning technology is an important best practice. That implies clarifying the differences between online and face-to-face learning, and training students to use online-course technology. Most California community colleges, as with online learning programs across the country, use orientation or readiness-assessment products to gauge a student's online-learning comfort level prior to enrollment in an online class. Typically, students take an initial online quiz that determines how at ease they are with the technology. An electronic presentation follows, orienting the student to online learning norms. The presentation details how to navigate the course-learning management system and dispels the myth that online courses are less rigorous than traditional ones.^{9,10} Yet, there is little consistency in the content and form of online orientation. Furthermore, the distance-education coordinators and online instructors we spoke with see little evidence that current online orientation products are effective. They noted that students were seldom engaged by orientation, and often did not retain its information. Currently, it remains the online instructors' responsibility to guide students through the online learning process, making sure they know how to interact with each other and are engaged with the course material.



GETTY IMAGES

Instructors of successful online courses emphasize the importance of faculty training and mentoring.

Regular and Effective Interaction

Online learning can be an isolating experience for both students and faculty. Therefore, regular and effective interaction is essential to establish a successful online learning environment. Interaction should take many forms: between students and faculty, among students themselves,

and between students and the online course material. Researchers have found that a student's perceived learning is correlated with how much of a sense of social presence is created in an online course (Herbert 2006; Morris 2009; Tello 2007). Rachel Rimmershaw (1999) notes that, when the course structure allows students to develop strong working groups, they perceive the course to be "congenial," see themselves as a community, and perform better.

Ensuring frequent interaction between instructors and students has been an important best practice since the beginning of California's community college distance-education programs. In 2007, the California Code of Regulations was updated to clarify that, "Any portion of a course conducted through distance-education includes regular effective contact between instructor and students. Regular and effective contact is an academic and professional matter pursuant to section 53200."¹¹ This language requires that distance-education courses meet the same quality standards as face-to-face courses.

In addition, the Accrediting Commission for Community and Junior Colleges, a regional accrediting body for community colleges in California, requires that distance-education courses ensure "regular substantive interaction" between instructor and student.¹² Each college in the community college system further defines regular and effective contact by promulgating specific faculty and student requirements. For example, at Mount San Jacinto College, online students must have the same number of weekly instructor contact hours as students in traditional classes.¹³ Foothill and San Bernardino Valley Colleges direct faculty to respond to student emails or discussion board posts within 24 to 48 hours.¹⁴ While these guidelines are considered acceptable, they do not necessarily represent best practices. The most successful online instructors track student engagement and seek out students who seem to be disengaged or struggling. For example, an instructor might require that students check the course syllabus by a certain date. The instructor will then email or text students who fail to do so, letting the student know that the instructor cares about that student's success in the course.

The online instructors we interviewed repeatedly stressed the importance of fostering student-to-student interaction. They cited message boards, discussion groups, blogs, chat rooms, and even video conferencing software like Skype as important tools for students to connect with each other. Student-to-student interaction can help develop a sense of community and purpose similarly found in traditional classes. Furthermore, student interaction can be effective in dealing with an online course's technical and logistical problems. Students are often better able than instructors are in answering classmates' questions. Greater interaction between students, faculty, and the course material makes everyone more invested in the online course, helping create a more positive, active learning environment.

Successful online learning depends on adopting a systems approach to course design: offering effective faculty support, setting appropriate student expectations, and promoting interaction among faculty, students, and course materials. Without these practices, faculty become frustrated, students become discouraged, and success rates decline. However, these practices generally follow the paradigm of *replicating* the face-to-face classroom experience. In the next section, we look at the next generation of online learning, in which the goal is not merely to recreate face-to-face pedagogy, but to identify the unique advantages and opportunities of online learning.

Potential Advantages of Online Learning

Online learning technology has changed rapidly over the past decade. On college campuses, technological infrastructure, increased bandwidth, and vastly improved learning management software have opened the way to new online pedagogy not previously available to instructors. Additionally, it has shifted the online pedagogy debate from a discussion of how best to replicate face-to-face learning to an examination of what advantages online learning potentially provides over the traditional model. Improved knowledge of student needs, personalized learning, and instantaneous feedback may provide avenues to eliminate the online performance gap (Johnson and Cuellar-Mejia 2014; Jaggars and Xu 2013).

Improved Knowledge of Student Needs

Online learning provides opportunities to collect data on student preparedness, performance, and preferences that are far more difficult to get in traditional courses. In contrast with students in traditional classrooms, online students leave a virtual “clickstream,” which is tracked by commonly used learning management systems. This practice provides a rich data source that instructors and administrators can use to assess student behavior—a technology often called predictive analytics. Did the student log into the course homepage, view the syllabus, or open an assignment? What time did he or she turn in an assignment? Did the student post questions on a message board or participate in a course chat room? Did he or she explore additional readings? This information is integrated into a larger data set, which includes material on age, socioeconomic status, individual learning style, performance, past academic history, and routine assessments. The community college system can aggregate these data to identify factors that affect overall student retention, momentum, and success. It can also allow the system to focus its limited resources on targeted intervention to help at-risk and struggling students.

A number of two- and four-year institutions across the country are leveraging predictive analytics to improve success rates in online course offerings.¹⁵ Many of these efforts have yet to be rigorously evaluated, but they seem to offer promising results. For example, Rio Salado College, a large primarily online community college in Arizona, has used predictive analytics to improve its online course success rates. The system, which the college calls Progress and Course Engagement (PACE), identifies students at risk of failing to complete a course successfully based on their level of engagement with the material. Rio Salado College identified three main predictors of success: how often the student logs into a course; site engagement, i.e., whether he or she reads the course materials online, does practice exercises, and shows other signs of engagement; and how many points the student scores on assignments. Using these indicators, Rio Salado categorizes students into one of three groups based on whether a student is likely to successfully complete their online course. When students log into the course management system, they see a

Online learning provides opportunities to collect data on student preparedness, performance, and preferences that are far more difficult to get in traditional courses.

green, yellow, or red indicator showing how well they are doing compared with students who completed the course within the past year. The system also shows these indicators to the instructor and to the student advisor, allowing them to identify each student's risk level. This makes it possible for focus instructors, advisors, and other institutional resources to *quickly* help those students most at risk. For example, faculty and advisors may call, email, or text students PACE identifies as at-risk to find out why they are struggling and to determine ways to help them.

One of the strengths of online learning is this capacity to use a large number of quantifiable variables to identify the level of risk that a student will not complete a course. This technology is scalable, providing instructors with information on day-to-day student progress not available in a face-to-face format.¹⁶

Regular and effective interaction is essential to establish a successful online learning environment.

Personalized Learning and Instantaneous Feedback

Any course, whether taught face-to-face or online, includes individual students with individual learning styles, experiences, and abilities. In the face-to-face environment, the instructor must adjust a course's pace and adapt content to accommodate multiple learning styles. The typical community college student body is diverse in ability and experience, and includes many nontraditional students. Developing courses that meet the needs of students with dissimilar academic backgrounds, learning styles, and capabilities can be challenging. Some students may lose interest and become frustrated because a course is moving too slowly. Other students may get discouraged because they feel the course is progressing too rapidly.

The asynchronous, individualized nature of online learning allows differentiation of course content. Students can control a course's pace to fit their learning styles and abilities. This individualization is achieved using adaptive instructional software, which personalizes lessons and customizes instruction in response to real-time feedback and assessment. Enterprises such as Khan Academy have championed this technology in the K–12 setting.

Our research found that interactive course software that provides instantaneous feedback could be particularly effective in improving student performance in online courses. Four of the top 10 performing online courses in our study were beginning microeconomics and macroeconomics classes taught by two professors at separate colleges. The common link between these courses and professors was the use of the same interactive course content software, initially developed by a Stanford economist. The software is a course content and management system providing problem sets, links to relevant news sources, multimedia, assessment, and grading. Chapter assignments and problem sets are automatically graded, providing students immediate explanations for every question. The software lets instructors monitor student progress in real time. It also allows instructors to follow each student topic by topic, achieving high levels of course personalization.¹⁷

In the four microeconomics and macroeconomics courses using this software, the online success rate was 79.2 percent. By comparison, our predicted average success rate for these courses, taking into account the demographic makeup of enrolled students, was 68 percent, which is 11 percentage

points lower. To put this in perspective, the typical online course pass rate in the community college system is 60 percent. It should be noted that these beginning economics courses require students to master difficult quantitative concepts. The courses qualify for transfer credit to both the University of California and California State University systems. Our analysis suggests that employing software that provides instantaneous feedback improves student results. One distance-education coordinator noted that such software allows students to remediate continually. If a student reaches an impasse in the content and the system cannot find a solution, the instructor is alerted. The instructor can step in, providing a story or example that helps the student understand the concept and move forward. In this way, the technology improves student performance and makes instructors more efficient.

Demand for online education is growing. This makes it essential to shift the online learning paradigm from replicating face-to-face pedagogy to practicing teaching methods that take full advantage of rapidly advancing technology. As bandwidth increases and software improves, online instructors are able to expand their repertoire and explore new teaching methods. Instructors become more capable of personalizing lessons to cater to student strengths, and grow more efficient in delivering high-quality online education. These new technologies will be essential if we are to narrow the significant online-learning achievement gap. These tools can help ensure that online education in the community college system carries out the mission of access laid out in the Master Plan for Higher Education. What then are community colleges and higher education policymakers doing to meet these challenges?

The Online Education Initiative: Costs and Recommendations

The governor's 2013 higher education budget allocated \$56.9 million for online education, with \$16.9 million earmarked to begin an Online Education Initiative (OEI) and additional funding of \$10 million per year through 2017–18.¹⁸ The initiative's overarching goal is to make more online classes available in California community colleges in order to help more students earn associate degrees and transfer to four-year universities. The OEI has several components, including identifying a statewide standard education portal and common learning management system that would allow California students to apply and register for online courses, developing a basic course quality standard and evaluation rubric, providing students with necessary support services, and training faculty in online pedagogy and technology.

To its credit, the OEI has actively sought to incorporate current best practices into its online learning program. First, the OEI is working to contract with an existing vendor to develop a single proprietary learning management system: the Common Course Management System. The system would be available to all colleges, although colleges would not be required to adopt it. Learning-management system designers hope to incorporate the most technologically advanced software: programs that preserve simplicity for inexperienced instructors, while providing features that advanced instructors can use to develop course content.

Second, the Online Education Initiative, with the support of the individual colleges in the system, has identified a pilot group of the most successful online courses offered across the system. The

initiative selected a group of highly qualified online-learning practitioners to review these courses using a rigorous rubric based on established best practices. As the initiative progresses, this course rubric will be used across colleges within the system to ensure quality and that online courses meet established standards.

Third, the OEI is developing a faculty training and certification program (with additional funding from the Chancellor's Office Telecommunication and Technology Infrastructure Program). The program consists of five online courses followed by a practicum requiring instructors to demonstrate their new skills. The program is offered at a low cost, and instructors will be able to complete certification in one academic year.¹⁹ The program is being modified to condense the training, allow individual customization, and to recognize previous training. These enhancements should allow faculty and administrators to identify specific training needs and provide those who complete the program with the skills required to meet new online-course design standards.

Finally, the Online Education Initiative has established working groups who are studying student readiness, education planning and articulation, and online tutoring. The ultimate goal of these groups is to establish multiple student services provided through the OEI portal that would prepare students to take courses online, help them plan their educational path, and provide online tutoring services to help students complete their online courses.²⁰

The OEI represents a significant step forward in the effort to bring online student success rates even with those of traditional courses. Still, several areas of concern remain. First is whether developing a system-wide learning management system is feasible in the allotted timeframe. Currently, each community college uses its own learning management system, though some districts, such as Contra Cost Community College District, use a single district-wide system. The variation in quality and complexity between learning-management-system software products is not large. Nonetheless, instructors often have a favorite and are loathe to switch after becoming comfortable with a specific product. Course content may not be completely transferable between learning-management-system software systems. Thus, if a single standard were adopted, instructors might be forced to recreate content they had already developed, which could become an obstacle to acceptance of a generic system.

A second concern is whether online learning expansion will succeed in reducing state higher education costs. One of the OEI's goals is to lower the cost of student education.²¹ Governor Brown has championed online learning as a cost saving opportunity. Online courses do not need physical classroom space, and course design and development costs can be amortized over time. Savings might also come through economies of scale, including centralization of online student services. Greater integration of campus online programs would boost purchasing power. Furthermore, if faculty members do not have to invest as much time designing, facilitating, and seeking approval for individual online courses, the community college system's overall labor costs could drop.

However, these savings are theoretical. So far, no empirical evidence demonstrates that online learning is less expensive than face-to-face learning. In fact, research shows that preparing an online course is usually more time consuming (and therefore expensive) than preparing a traditional class (Moller, et al 2008). Furthermore, it is unclear what the effects on cost would be if the community college system were to move from the individual model to the systems model of online course design. The design process initially requires software programmers, instructional designers, and multimedia specialists, raising the upfront cost of online course development.

As noted earlier, development costs can be amortized over time, but the costs of regularly upgrading software and updating course material could quickly exceed any savings from economies of scale. Additionally, providing essential student support services, such as technical support, online tutoring, and counseling, might significantly raise the community college system's costs. Community colleges must increase the hours these services are available for online course students because students do not attend online classes on a fixed schedule. As online course enrollment grows, the cost of these student services will increase. Although these services could be centralized, the cost savings of centralization could be offset by the need for new services and the expansion of current services.

Reducing the faculty role in course development and increasing online class sizes has the potential to reduce costs per student. However, implementing such changes may prove difficult. Collective bargaining agreements and state law prohibit online and other distance-education classes from having more students than equivalent face-to-face courses. Section 55208(b) of the California Education Code specifically states that the process a district uses to determine how many students to assign to a distance-education-course section must be the same as the procedure for traditional-faculty-course assignments. These rules also give faculty members significant control over both online and traditional course development and workload. Without significant changes to state law or collective bargaining agreements, it will be difficult for community colleges to increase online class sizes or significantly alter faculty workloads.

Despite these questions, it is vital to put the cost issue in perspective. Online student success rates in the California Community College System are about 10 to 14 percentage points lower than success rates in traditional courses. Online course success rates for African American and Hispanic students are significantly worse. If these gaps persist and online enrollment continues to increase, then community colleges will be less efficient and less equitable, thereby increasing costs to students and the state.

Even if online learning might not be a cost saver, it must be recognized as an important tool for improving access to higher education in California. Online course enrollments jumped nearly ninefold from 2002–03 to 2010–11 (Johnson and Cuellar-Mejia 2014). Community colleges should continue to accommodate demand for online learning while making sure that student outcomes are improved. The OEI is an important part of this process.

Implications for the Future of Online Learning

In many ways, the California Community College System's experience provides an excellent look into the future of online learning. The remarkable expansion of online learning in our state's community colleges offers valuable lessons as this technology takes a more prominent place in U.S.



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Online learning must be recognized as an important tool for increasing access to higher education.

higher education. One in four U.S. community college students attends a California college, and 55 percent of California community college students are ethnic or racial minorities. Furthermore, the number of California community college students taking an online course has more than doubled in the past decade. Demand for online learning is growing rapidly. Yet, even as online courses grow in popularity, students are less likely to complete them successfully, and ethnic and racial achievement gaps are wider than in traditional courses. The piecemeal, idiosyncratic online education system that has evolved over time at California community colleges has not narrowed those gaps.

Our research suggests that a more data-driven, integrated, and systematic approach is needed to make students more successful in online learning. It is critical to move away from the individual, faculty-driven model of online course design and delivery toward a more systematic approach. Under such a model, faculty members collaborate with administrators, media developers, and information technology experts to maximize the online medium's potential.²² A systematic approach better ensures quality by creating teams with a range of skills that a single instructor is unlikely to have. Greater integration and planning at the system level could also create a more consistent course-approval process. Such an approach would make it easier to add online courses in response to student demand, helping students complete degrees on time.

Development of new online learning technologies provides data collection opportunities that benefit students at all educational levels, whether they take courses online, face-to-face, or both. Improved data systems and advances in data visualization will allow faculty, administrators, and researchers to better track student engagement with course material and provide opportunities for instructors to customize teaching to each student's learning style. Predictive analytics and real-time data dashboards will allow faculty to assess student progress more accurately and help identify at-risk students before they become frustrated and withdrawn.

New online learning technologies are shifting the debate from a zero-sum comparison of the merits of online versus face-to-face instruction to something more valuable: a discussion on how best to integrate new teaching methods into the educational process. The California Community College System's Online Education Initiative is an important start. If it is successful, it will be a model that other states can follow to build their higher-education online learning programs.

NOTES

¹ The lower success rates in online courses versus traditional courses are estimated in statistical models that control for student characteristics (including proxies for academic skills), colleges, terms, and course subjects. The higher estimated difference (14%) is based on an approach known as instrumental variables, whereas the lower is based on a probit model. See Johnson and Cuellar Mejia 2014 for a complete description of our models.

² See Technical Appendix A. Of course, we cannot control for unobservable characteristics, such as motivation, which might differentiate students in online and traditional courses.

³ We chose 70 percent because that is the passage rate for traditional courses.

⁴ Details of our data and methodology are available in the Technical Appendix A.

⁵ Only students who were formally enrolled in a course are considered in our analyses. Thus, students who were shopping for courses or who exited courses at the beginning of the term are not included.

⁶ In statistical terms, the standard errors associated with predicting a successful course are large for our dependent variables, which include college, term, and subject.

⁷ It is also possible that new online course instructors were easier graders than instructors in older online courses.

⁸ We interviewed eight faculty members, distance-education coordinators, and online learning experts. See Technical Appendix B for more information.

⁹ The course-learning management system is the software program used by faculty to administer and by students to access the online course.

¹⁰ Almost all of the officials and instructors we interviewed stated that students commonly believe an online course will be less rigorous than a traditional course. Interviewees stressed that, in fact, the course content and learning objectives are the same in online versions of traditional courses.

¹¹ California Code of Education Title V, Section 55204.

¹² See the ACCJC Guide to Evaluating Distance Education.

¹³ See Mt. San Jacinto College Regular Effective Contact Policy.

¹⁴ See Foothill College Regular and Effective Contact for Online Courses Policy. See San Bernardino Valley College Regular and Effective Contact Policy.

¹⁵ See, for example, Campbell et al (2007), *Academic Analytics: A New Tool for a New Era*.

¹⁶ See the Rio Salado Predictive Analytics Description.

¹⁷ See the Aplia Company website.

¹⁸ See *The Online Education Initiative: A Progress Report*.

¹⁹ See the @One Company website.

²⁰ See California Community Colleges TechEDge OEI Update.

²¹ See the California Community Colleges Education Planning Initiative Goal.

²² This approach could lead to cost savings because of economies of scale, but could be more expensive because effective design and delivery requires increased investment.

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