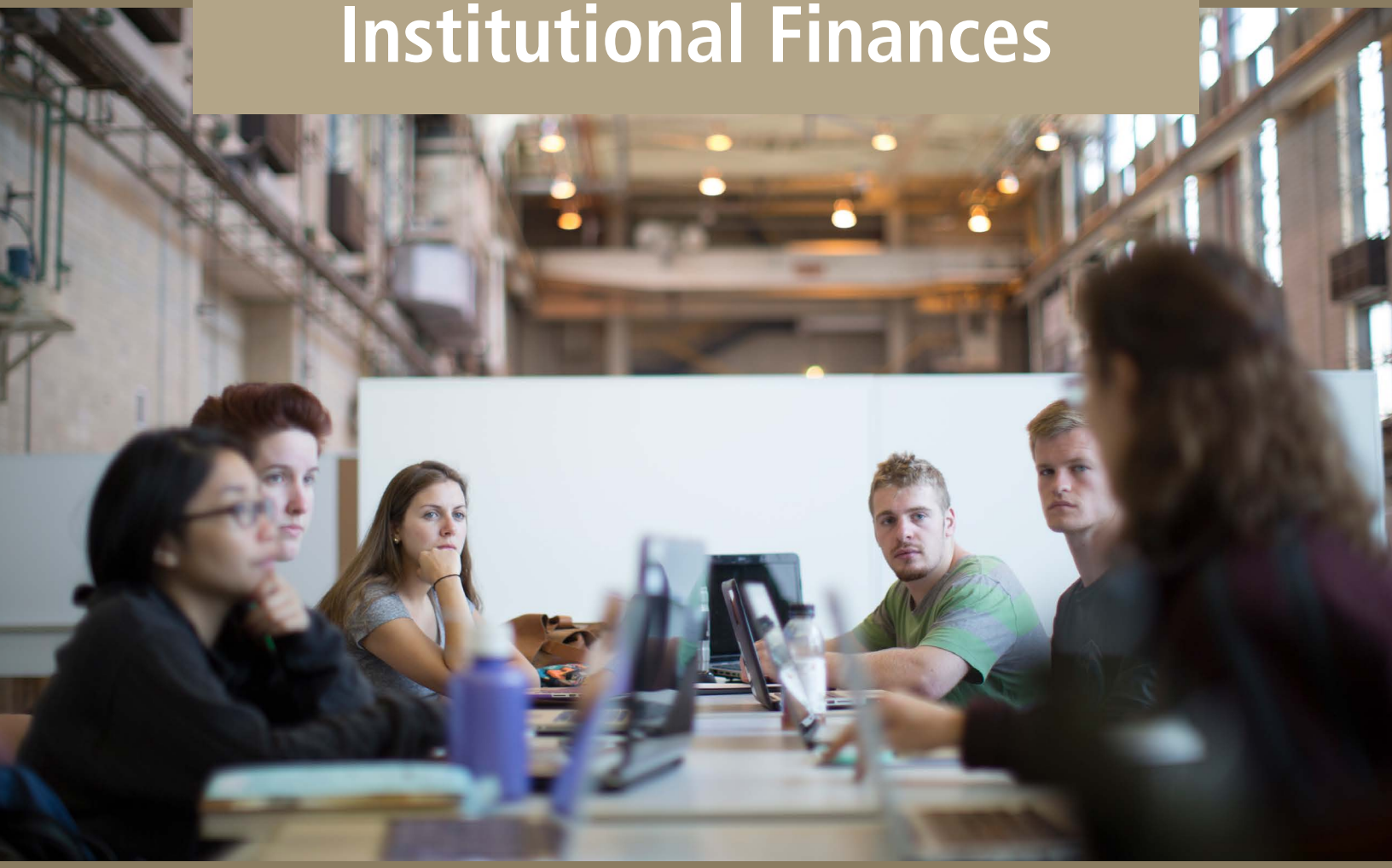
American Council on Education®
Leadership and Advocacy

Instructional Quality, Student Outcomes, and Institutional Finances



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The American Council on Education (ACE) has long worked to improve postsecondary attainment by providing quality assurance of college-level learning outside the classroom, promoting alternative education pathways, and working with institutions to create and implement student-centered, attainment-focused instructional approaches and practices that can lead to improved student outcomes and more timely postsecondary credential completion. Quality instruction is the backbone of the higher education institution, and ACE is invested in researching the connections between more effective pedagogical approaches that lead to improved student outcomes. It is our belief that individuals who embrace the most effective teaching practices are more likely to impact the student experience positively, and lead to improved student retention, persistence, and success.

ACE's work to conduct cutting-edge research to examine higher education instruction and assess the connections between quality teaching and student success is made possible by a generous grant from Strada Education Network, formerly USA Funds.

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INTRODUCTION

Over the past several years, higher education institutions of all types have faced increasing financial challenges and budgetary constraints (Ostashevky 2016; Seltzer 2016). At the same time, there is (hotly debated) evidence that college teaching is having a limited impact on students' critical thinking, complex reasoning, and writing skills (Arum and Roksa 2010). This juxtaposition presents a conundrum: The conventional wisdom is that increasing instructional quality is not possible without increasing expenditures, but colleges and universities have limited resources to spend on improving instructional quality.[1] But what if the relationship between instructional quality and institutional finances were more complex than that?

In this white paper, we explore the question of whether improvements in instructional quality can increase a postsecondary institution's net revenue. We lay out a conceptual framework in which improvement in instruction leads to better student outcomes such as increased retention rates, decreased repetition of courses, and faster time to degree. These improvements in student outcomes, in turn, lead to increases in marginal revenue that are larger than the marginal costs of improving instruction and of serving a larger student population. Surveying the literature, we find some evidence supporting this hypothesis, though no previous study has explored it directly.

We begin the paper with a discussion of various constructs of instructional quality and net revenue, and propose a conceptual model through which changes in instructional quality could impact net revenue. In the second and third sections, we review the relevant empirical literature. First, we review published research on the relationship between instructional quality and institutional budgets, as well as mediators of that relationship. Next, we review the literature on the relationship between other program- and course-level features and net revenue, which offer substantive or methodological insights on the instruction-net revenue relationship. In the fourth section, we briefly profile four postsecondary institutions that have sought to improve instructional quality systematically. We describe these institutions' strategies and discuss their relationship to student outcomes and net revenue. We conclude with some recommendations and considerations for further research, highlighting relevant research questions and models, pointing to areas in which further research is needed, and reflecting on some challenges to successful interventions and measurement.

Because institutions are under increasing pressure to simultaneously cut costs *and* improve student outcomes, it is crucial that college and university leaders explore the complexities of the relationship between these two goals. While conventional wisdom posits that an institution must increase expenses and decrease net revenue to improve student outcomes, current institutional budgeting practices do little to monitor these efforts and results in tandem. At most institutions, the cost of interventions that effectively improve student outcomes, the relationship between these interventions and other campus activities or allocations, and the long-term impact of improved outcomes on net revenue are rarely measured or incorporated rigorously into decision making. This paper sets up a framework

1 This relationship is one of three articulated in the concept of the "iron triangle," which assumes that as institutional quality and access increase, costs must increase as well. See Immerwahr, Johnson, and Gasbarra 2008; see also Capaldi 2011.

through which institutional leaders can begin to think through the dimensions of this relationship, and suggests that financial decisions and monitoring can and should be considered in relation to quality, performance, and outcomes.[2]

2 For a more sustained discussion of the "black box" of college spending and the need to better link postsecondary accounting and budgeting to outcomes and quality, see Soares, Steele, and Wayt 2016.

CONCEPTUAL FRAMEWORK

DEFINING INSTRUCTIONAL QUALITY AND INSTITUTIONAL NET REVENUE

Instructional quality is an elusive concept, but efforts to define and measure it typically focus on instructional inputs, instructional outputs, or the relationship between the two. Inputs for instructional quality include behaviors, materials, and characteristics of instructors or the instructional process, usually assessed through observations, curricular artifacts, student artifacts, tests of teaching skills, or student surveys.[3] For example, some of the studies we review in the next section focus on particular pedagogical approaches, student-teacher interactions, the type and use of assessments, or the use of technology as components of instructional quality. Outcome-based definitions of instructional quality focus on how student behaviors and accomplishments—such as achievement of learning outcomes, course grades, persistence, or choice of major—vary by instructor. These definitions measure an instructor's quality based on those outcomes.[4]

In considering efforts to improve instructional quality, we maintain that the most sensible approach is to consider both inputs and outcomes, or to look at how actionable instructional inputs impact student outcomes. To improve instructional quality at scale, one must know who the instructors are, what they are doing, and whether what they are doing is effective.

Institutional net revenue is easier to define than instructional quality. It is a postsecondary institution's revenue from all sources minus its expenditures. It is of course possible to quibble about the precise revenue sources and expenditures to include or exclude, but for the purposes of this white paper, the general concept is sufficient. It is also possible to extend the analysis—considering externalities or effects on public finance, for example—but, again, for purposes of this paper, we will confine ourselves to an institution's balance sheet.[5]

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3 See the convening report *Measuring Instruction in Higher Education*, November 2014, which reviews numerous observational protocols, measurement instruments, and instructional techniques, available at http://wtgrantfoundation.org/library/uploads/2015/11/Measuring-Instruction-in-Higher-Education.pdf. See also Jankowski 2017. Assessing the presence and efficacy of inputs can be challenging. For example, reviews of observation-based and input-based definitions of instructional quality in K–12 and postsecondary education have found that it is difficult to construct valid and reliable measures of observed instructional quality, and that the tendency is for these measures to conflate instructional techniques, student characteristics, and instructional outcomes. These challenges increase with scale. Additionally, because teaching and learning are context-dependent, input-based definitions of instructional quality may only be suited for certain contexts, subjects, students, or institutions.

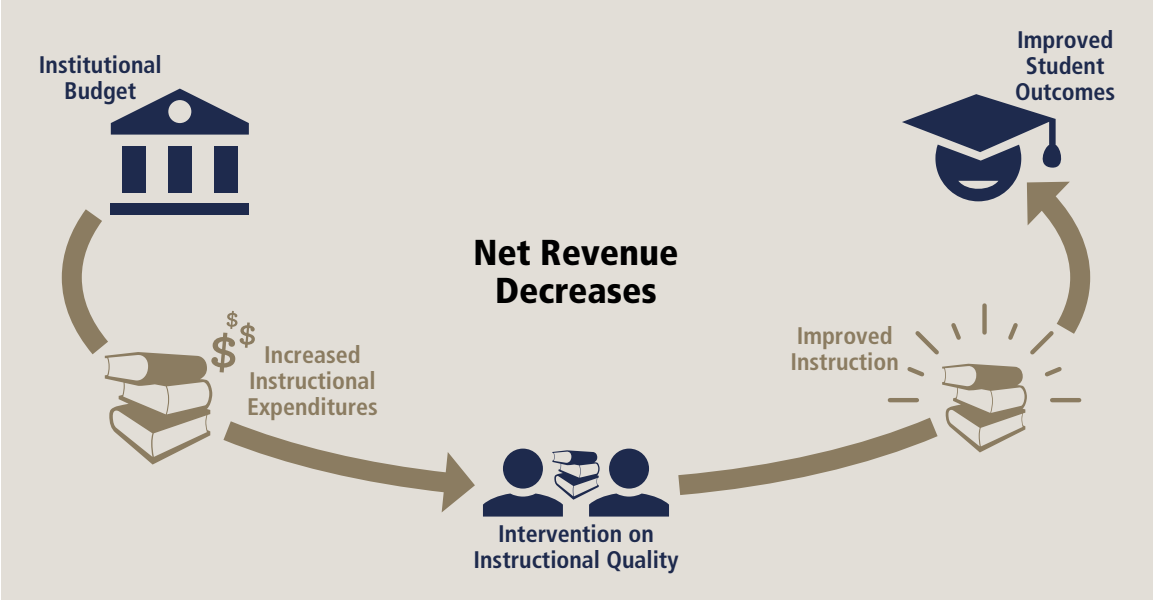
4 Rigorous efforts to define instructional quality based on student outcomes will take account of student background characteristics. However, since it is rare in postsecondary education to have consistent, valid, and reliable measures of student learning outcomes in a subject across sections within an institution, let alone across institutions, measuring changes in outcomes due to a single instructor remains challenging. See Cunha 2014. Some studies reviewed here, including Bettinger and Long's (2004) study of rank and Carrell and West's (2010) study of student evaluations and course grades, exploit unique institutional conditions to employ a value-added analysis.

5 The Delta Cost Project and the National Center for Educational Statistics, for example, define institutional

THE RELATIONSHIP BETWEEN INSTRUCTIONAL QUALITY AND INSTITUTIONAL NET REVENUE

The conventional view of the relationship between instructional quality and institutional net revenue is that it is a one-directional, inverse relationship that operates through expenditures. Specifically, it is widely held that increases in instructional quality require increased instructional expenditures, whether on higher salaries to motivate, recruit, or retain more talented or experienced instructors, on pedagogical training, or on more effective materials and technologies (see Figure 1). Consequently, this proposition also assumes that decreases in expenditures will diminish instructional quality. When expenditures go up, net revenue goes down; when expenditures go down, net revenue goes up. Therefore, an investment to increase instructional quality will diminish net revenue, while a disinvestment will increase net revenue.[6]

Figure 1. Conventional view of relationship between net revenue and student outcomes



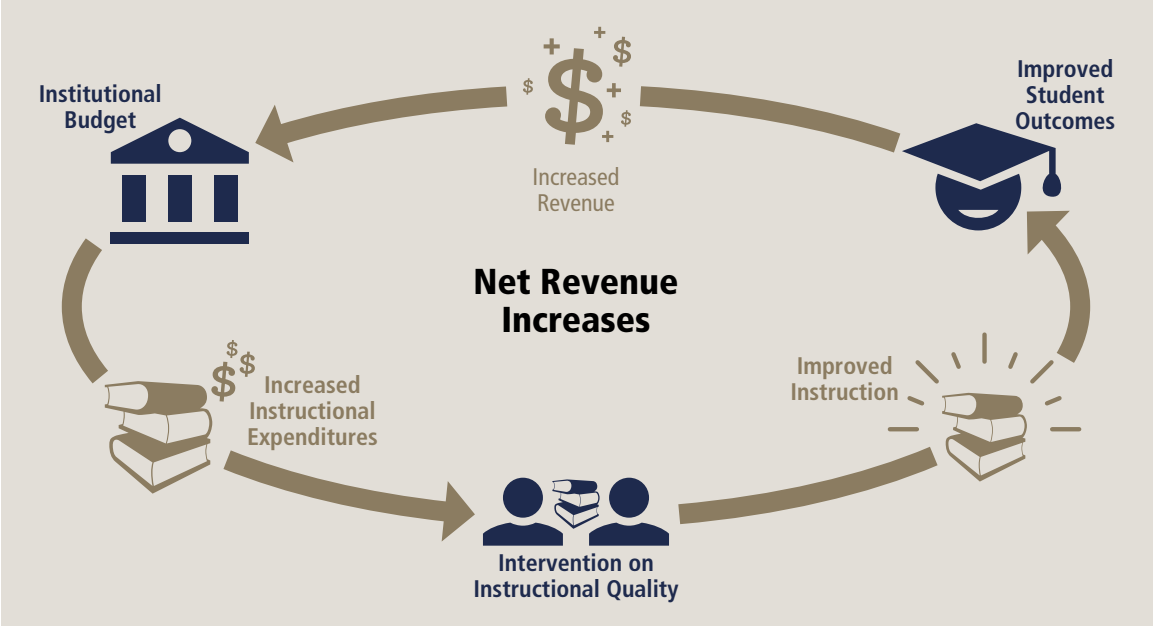
What this conventional view misses, however, is the possibility of a feedback loop in which improvements in instructional quality increase revenue or decrease expenditures other than those that went

revenue as income from the following sources: net tuition; state and local appropriations; federal appropriations and federal, state, and local grants and contracts; auxiliary enterprises; operating revenues; and private and affiliated gifts, grants, contracts, investment returns, and endowment income. See Kirshstein and Hurlburt 2011. For a discussion of approaches to thinking about institutional budgets, see Johnson 2016.

6 For example, efforts to mitigate cost per completion could focus on identifying cheaper, and perhaps lower-quality inputs (e.g., reduced class time, fewer sections, larger classes, and more poorly trained instructors), thereby diluting student learning, and the quality and value of student completion. See, for example, Mackie 2016. This argument is popular in critiques of increasing reliance on contingent faculty. See, for example, Belfield 2015. Some research also suggests that instructional expenses are positively correlated with student outcomes. See Gansemer-Topf Schuh 2003.

into improving instructional quality. The primary mechanism for this feedback loop is increased student success: Instructional improvement can improve student outcomes, which can in turn increase revenue or decrease expenditures by an amount that exceeds the cost of instructional improvement (see Figure 2).

Figure 2. Proposed feedback loop between net revenue and student outcomes

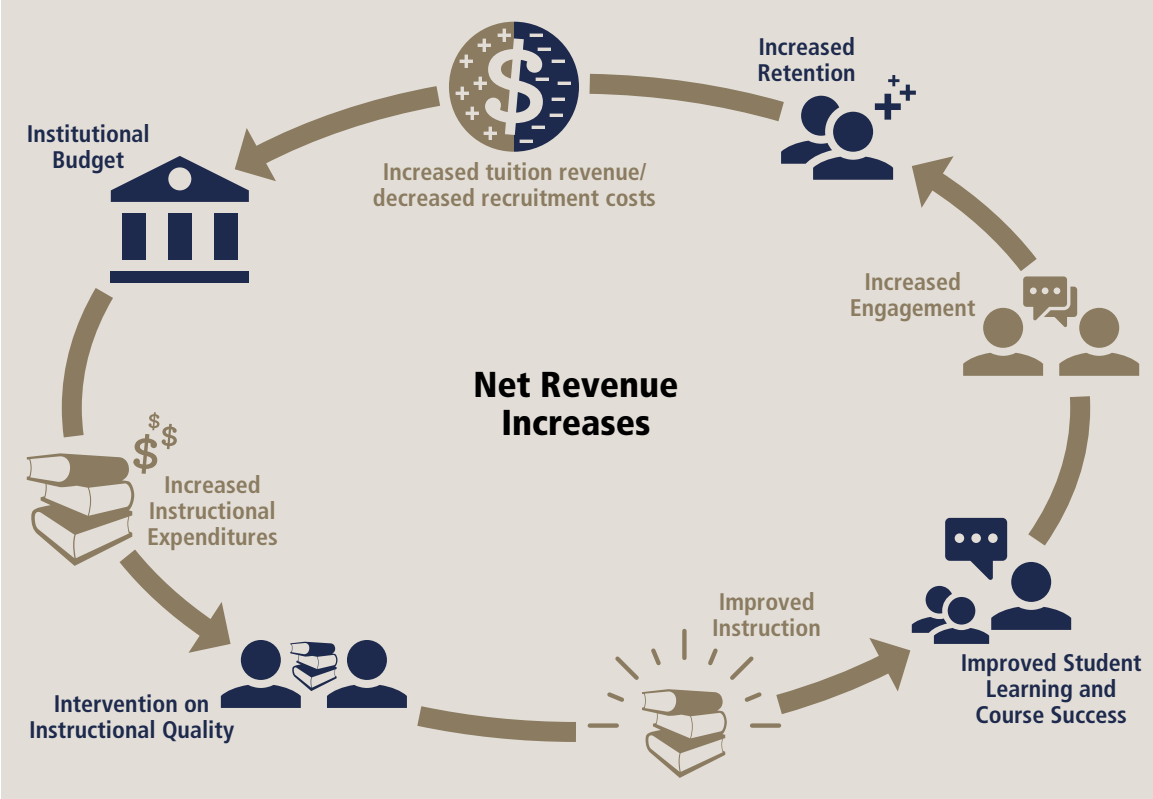


There are a variety of ways in which improved student outcomes, driven by instructional improvement, may increase institutional revenue. First, as discussed in more detail in the next section, instructional quality is positively associated with student retention, and greater retention can increase institutional net revenue by avoiding revenue gaps and inefficiencies related to attrition (see Figure 3).[7] When students attrite, institutions lose revenue from lost tuition, fees, and other purchases (textbooks, dining, housing, etc.) until a replacement student enrolls. Recruiting a new student can cost three to five times as much as retaining a student who is already enrolled. Attrition can also lead to staffing and facilities inefficiencies (Cuseo 2010; Noel, Levitz, and Saluri 1985).[8]

7 See, for example, Raisman 2013; Johnson 2012; Schneider 2010; and Grayson and Grayson 2003.

8 See also Noel-Levitz 2013.

Figure 3. Proposed feedback loop between net revenue and student outcomes, retention example



The revenue advantages of increased retention can be quite substantial. For example, Hossler and Bean (1990) estimate that a student who remains at an institution for four years generates the same amount of revenue as four new students who leave after one year.[9] In analyses of the cost of attrition, Raisman (2013) estimates that the average public, four-year postsecondary institution lost nearly $10 million in revenue from attrition in the 2010–11 academic year, and Johnson (2012) finds that roughly 20 percent of an institution's average educational expenses are directed toward students who do not earn degrees.[10] Other research, discussed in a later section, has found that, because of the revenue lost from attrition, initiatives aimed at increasing retention are cost effective and lead to net revenue generation.[11]

While the positive relationship between retention and net revenue is most well established, there are other possible mechanisms through which instructional improvement might affect an institution's bottom line. Instructional quality is positively correlated with student learning and motivation, course pass rates, and subsequent interest in a subject, all of which have the potential to decrease course

9 See also Hossler and Bean 1990, cited in Cuseo 2010.

10 For a discussion of how one might build an estimate, see Schuh 2012.

11 For recent efforts to operationalize this research, see Jobs for the Future and the Delta Cost Project's (2010) Investing in Student Success Pilot Project and Cost-Return Calculator.

retake and time to degree. These outcomes are all positively associated with retention,[12] and course retake or enrollment in surplus credits may require additional investment in staffing and facilities. Furthermore, from an efficiency standpoint, course retake, enrollment in surplus credits, and greater time-to-degree mean that an institution is spending more (and redundantly) on students without a corresponding output.[13]

Finally, improved student outcomes have the potential to increase institutional net revenue by increasing an institution's eligibility for outcomes-based funding. A number of states allocate some funding to institutions based on the extent to which students at that institution meet success targets related to progression, completion, transfer, and employment.[14] For example, the Tennessee Higher Education Commission's outcomes-based funding model allocates funds based on metrics like credit accumulation, degree completion, transfers (for community colleges), job placements, and workforce training to the state's four-year institutions, two-year institutions, and technology centers. The North Carolina Community College System allocates funds based on developmental student success in college-level courses, first-year progression, curricular student completion, licensure and certification passing rate, and college transfer performance. In many cases, these funding formulas are input-adjusted so that high-risk students' performance on these metrics is weighted more heavily (Miller 2016).[15]

12 See the Community College Research Center's concept of key performance indicators (KPIs), which it defines as milestones that a student reaches on her progression to the completion of award, such as the passing college math in the first or second year, first- to second-year persistence, credit accumulation targets, etc., in Belfield, Crosta, and Jenkins 2014 and Attewell, Heil, and Reisel 2012.

13 For a more sustained discussion of cost per degree and a model for measuring it, see Belfield, Crosta, and Jenkins 2014 and Auguste, Cota, Jayaram, and Laboissière 2010. While this definition of efficiency is crucial in evaluations of higher education—and a popular one in most measurements of cost-effectiveness—we focus on increases in institutional net revenue as a more urgent and actionable target for institutional leaders.

14 For a collection of research on performance funding, see the 2015 article "Lumina Foundation Papers Highlight How Outcomes-Based Funding Focuses Public Colleges and Universities on Increasing Student Completion," by Lucia Anderson Weathers, and accompanying resources, at https://www.luminafoundation.org/news-and-views/s7-outcomes-based-funding-paper-series, and "Performance Funding," Community College Research Center, http://ccrc.tc.columbia.edu/Performance-Funding.html.

15 See the Tennessee Higher Education Commission's "2015-2020 Outcomes Based Funding Formula" web page at https://www.tn.gov/thec/article/2015-20-funding-formula and the North Carolina Community Colleges report *2014 Performance Measures for Student Success* at http://www.halifaxcc.edu/FactBook/Performance-Measures/2014_performance_report.pdf.

RESEARCH ON INSTRUCTIONAL QUALITY AND INSTITUTIONAL REVENUE

Because the chain of causation is long, and benefits would most likely only be observed at scale, rigorously testing the conceptual framework described above is challenging. We are unaware of any study that specifically addresses the impact of interventions to increase instructional quality on net revenue. There are, however, multiple studies on the relationship between institutional expenses and student outcomes, which we review below. There is also a robust literature on the relationship between constructs of instructor quality and student outcomes such as course success, retention, and degree completion. We review that body of literature in four categories representing different constructs of instructional quality: instructional practices; participation in faculty development; instructor characteristics; and students' perceptions of instructor effectiveness.

INSTRUCTIONAL EXPENDITURES AND STUDENT OUTCOMES

Research on the impact of instructional and other institutional expenditures on student outcomes has produced mixed results, but most researchers find that increased instructional expenditures are associated with better outcomes. For example, Gansemer-Topf and Schuh (2003) find that increased expenditures on instruction and academic support are correlated with higher first-year retention and graduation rates at research universities; Ryan (2004) observes similar outcomes at a larger set of baccalaureate institutions. Examining general expenditures at public, four-year universities, Cantrell (2006) finds no correlation with six-year graduation rates, while Webber and Ehrenberg (2010) find that greater *non-instructional* expenses correlate with higher graduation and persistence rates, especially at institutions that serve larger shares of students with lower entrance test scores and Pell-eligible students.[16] While these studies suggest a positive relationship between instructional expenditures and student outcomes, they also leave room to explore the complexities of this relationship, how to achieve efficiencies within it, and the longer-term financial impacts of investment.

INSTRUCTIONAL PRACTICE AND STUDENT OUTCOMES

A number of researchers have studied the relationship between instructor adherence to particular pedagogical methods (measured through observations by peers, student surveys/evaluations, or both) and student outcomes. There is evidence, for example, that active learning pedagogies—which include inquiry-based learning, role playing, cooperative learning, and debates—positively impact student mastery, course grades, and completion.[17] For instance, several studies of active-learning modifications

16 Other studies that explore the relationship between expenses and outcomes include Ryan 2005, which finds a negative relationship between administrative expenditures and student learning; Pike, Smart, Kuh, and Hayek 2006; and Titus 2006, finding that administrative expenditures is negatively correlated with student engagement.

17 For an overview of some of these practices, and evidence of their impact based on the National Survey of Student Engagement, see Kuh 2008.

in introductory engineering courses have found a positive effect on course completion, especially for students with average or below average scores.[18] Braxton and colleagues (Braxton, Milem, and Sullivan 2000; Braxton et al. 2008) find that active learning techniques such as class discussions and higher-order thinking activities are positively associated with students' social integration and subsequent institutional commitment and persistence.[19] In a broader review of practices across institutions, Umbach and Wawrzynski (2005) find that students report higher levels of engagement and learning at institutions where faculty members use active and collaborative learning techniques, interact with students, and emphasize higher-order cognitive activities.

There is also evidence that instructional transparency, clarity, and organization have a positive impact on learning and persistence. Braxton, Bray, and Berger (2000) and Pascarella, Seifert, and Whitt (2008) find that measures of overall instructional organization and clarity are positively associated with social

Students report higher levels of engagement and learning at institutions where faculty members use active and collaborative learning techniques, interact with students, and emphasize higher-order cognitive activities.

Photo courtesy of ACE member institution Rider University (NJ).

18 See, for example, Kvam 2000 and Prince 2004.

19 Many of these studies use Vincent Tinto's theory of academic departure, which posits that in order to persist, students must socially and academically integrate into their campus community, and that this process is facilitated by the college environment, peer and faculty interactions, and student compliance with social and academic norms. See Tinto 1987. For a review of research that draws from Tinto's framework or derivations of it, see Pascarella and Terenzini 2005.

The more a faculty member participated in development programs, the more her teaching and the outcomes of her students improved.

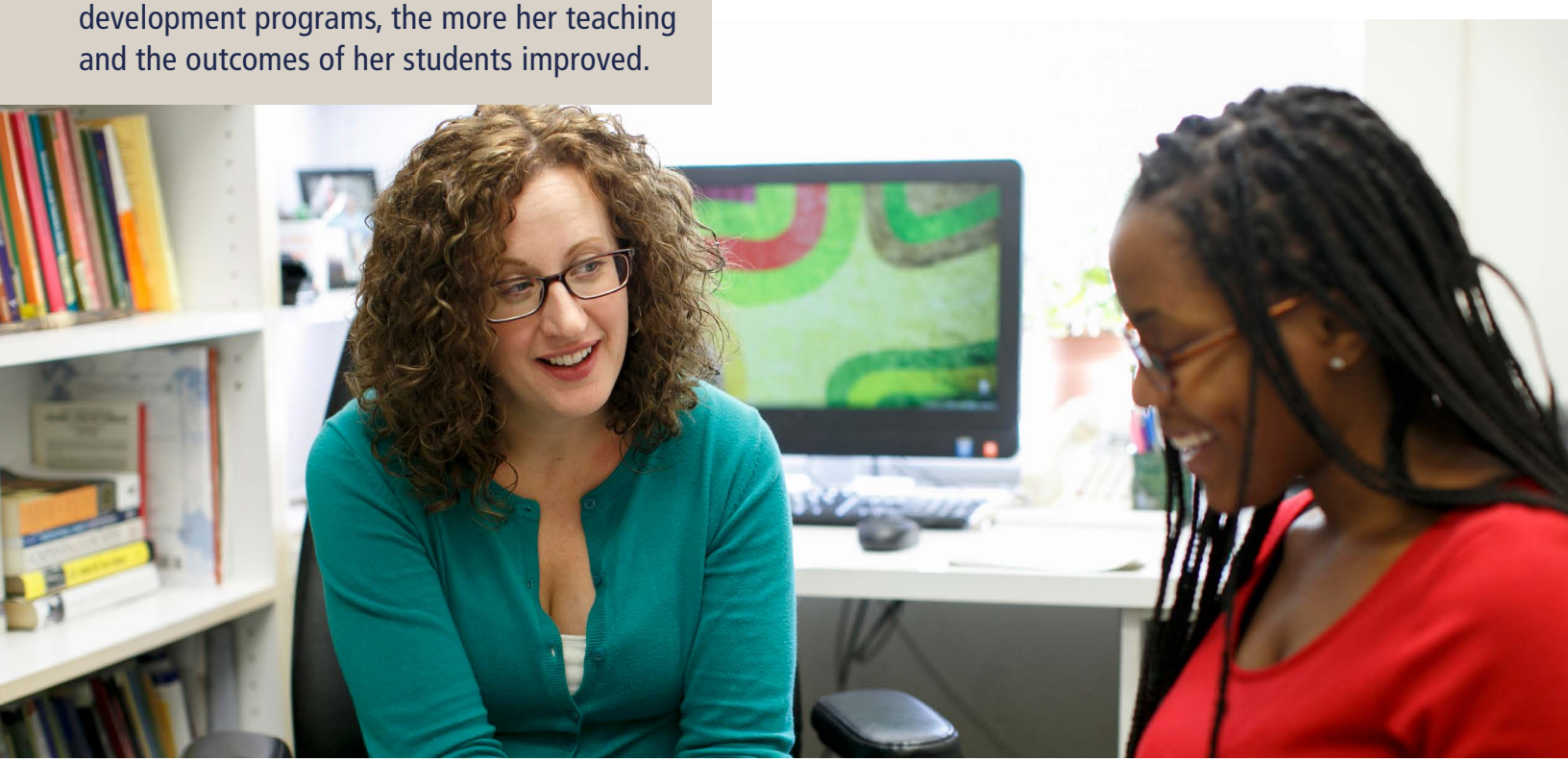


Photo courtesy of ACE member institution Mary Baldwin University (VA).

integration and first- to second-year persistence.[20] Trigwell, Prosser, and Waterhouse (1999) find that when instructors explain their approach to teaching as changing student conceptions, students take deeper approaches to learning, and Lambert et al. (2012) report that faculty who are rated high on scales of teaching clarity and good faculty practices tend to have students who have higher GPAs and persistence rates. In addition, Pascarella, Seifert, and Whitt (2008) have reviewed empirical studies of the relationships between student perceptions of teaching skills and course achievement, and found that instructional clarity, organization/preparation, and expressiveness have all been shown to contribute to improved course achievement (Pascarella, Seifert, and Whitt 2008).

Aligned and formative assessment also associate positively with student learning and course performance. For example, using document analysis, interviews, and a survey, Wang et al. (2013) find that students in more "constructively aligned courses" (where learning outcomes are aligned with assessment tasks) adopt deeper learning approaches. Teater (2011) finds that the use of constructive alignment, along with other research-based teaching and learning approaches, correlates with improved student learning outcomes in a social work undergraduate course. An evaluation of the use of e-portfolios and other forms of assessment found that assessment feedback increases learning outcomes and self-regulated behaviors among students.

20 Braxton, Bray, and Berger all study a sample of full-time students at a highly selective, private research I university and only measure intent to reenroll in the second year; Pascarella, Seifert, and Whitt follow a sample of students into their second year at a large, public research university, examining actual persistence as well as intent to reenroll. See Braxton, Bray, and Berger 2000; Pascarella, Seifert, and Whitt 2008.

Finally, several studies have found a correlation between faculty accessibility and support on the one hand, and increased learning and progression on the other. Relying on data from engineering programs at four research universities, Vogt (2008) finds that perceived faculty accessibility and integration is correlated with higher student-reported levels of self-efficacy, academic confidence, and GPAs. Shelton (2003) finds that student perceptions of faculty psychological and functional (academic/career) support are positively correlated with persistence in nursing programs. And Lambert et al. (2012) find that "good faculty practices," which include psychological and emotional support, degree and career support, academic subject knowledge support, and acting as a role model, are associated with increased GPAs and persistence for both first-year students and seniors at 19 different institutions.

PROFESSIONAL DEVELOPMENT AND STUDENT OUTCOMES

Studies of the relationship between faculty participation in professional development and student outcomes tend to find a positive relationship between the two, though these studies are often descriptive and rely on smaller sample sizes than others reviewed in this paper. For example, Ambrosino and Peel (2011) follow 10 faculty who participated in faculty development at a state health science university, and in evaluations of instructor reflections and student feedback, find a positive relationship between faculty development, instructional change, and student learning and motivation.[21] McShannon et al. (2006) and Perez, McShannon, and Hynes (2012) find that faculty who participated in a retention-focused, semester-long faculty development program at a community college increased the rate at which their students completed their courses and persisted to the next year. Khoule et al. (2015) find that LaGuardia Community College of The City University of New York students who take developmental math and English with instructors who participate in a two-semester, online faculty development program that emphasizes reflective practice have higher pass rates and retention rates.

Studies at four-year institutions have also found a positive relationship between instructor participation in faculty development and student outcomes. Researchers at Carleton College (MN) and Washington State University used rubrics and observational techniques to measure both improvements in instruction as well as improvements in student skills such as critical thinking and effective writing. They found that, at both institutions, the impact of participation in faculty development was cumulative: The more a faculty member participated in development programs, the more her teaching and the outcomes of her students improved. Moreover, faculty participation in development had long-term impacts on student learning; students of participating faculty continued to demonstrate increased learning over time (Condon et al. 2015).

INSTRUCTOR CHARACTERISTICS AND STUDENT OUTCOMES

A number of studies examine the relationship between instructor characteristics—such as tenure status, experience, and salary—and student outcomes, with mixed results. For example, Chingos (2016) finds that instructors' highest degree earned, full-time status, and experience are positively correlated with student exam scores and course success rates in developmental algebra courses at a large com-

21 For a methodological discussion of this sort of work, see Elliott and Oliver 2015.

munity college, though variation across instructor due to unobserved factors is greater than variation explained by observed characteristics. Similarly, Bettinger and Long (2004) find that students of adjunct or graduate assistant instructors in humanities courses have less subsequent interest and success in the subject than students of full-time faculty members, but greater subsequent interest in some technical and professional fields.[22] Carrell and West (2008) find that rank, teaching experience, and degree status correlate negatively with contemporaneous student course performance but positively with subsequent achievement.

Figlio, Schapiro, and Soter (2013), on the other hand, find that non-tenure-line faculty members contribute more to student interest in a subject and subsequent course performance in introductory classes at Northwestern University (IL), especially for less qualified students.[23] Other studies have found that faculty rank and salary have no effect on student outcomes, and that factors such as perceived effectiveness (as measured by student evaluations) are more positively correlated with student outcomes (Hoffmann and Oreopoulos 2006).

PERCEIVED INSTRUCTOR EFFECTIVENESS AND STUDENT OUTCOMES

A final category of research examines the relationship between perceptions of instructional effectiveness (as measured by student evaluations and assessments) and student outcomes. For example, leveraging the random assignment of a large set of students across multiple core subject areas at the U.S. Air Force Academy (CO), Carell and West (2008) find that instructors rated as more effective by students have students who achieve at higher rates in their own classes, but at lower rates in subsequent courses. Weinberg, Fleisher, and Hashimoto (2007) report similar findings in a section-level analysis of course evaluations, current grades, and subsequent grades in economics courses at The Ohio State University. Elliott and Healy (2001) find that student ratings of an instructor's "instructional effectiveness" are positively related to overall student satisfaction, which the authors argue impacts retention.[24]

The studies described above provide evidence of a positive relationship between instructional improvement and student outcomes that relate to engagement, learning, course success, persistence, and retention. In particular, they suggest that investments in professional development and particular pedagogical practices can effectively improve student outcomes. Although none of these studies take the extra step to evaluate the impact of those improvements in outcomes on institutional net revenue, the research cited in the previous section and the next section does draw a connection between the two. Combining the findings of these bodies of research supports the hypothesis that an investment in instructional improvement has the potential to be revenue neutral or even revenue positive.

22 See also Bettinger and Long 2010.

23 See also Ernst 2002.

24 See also Weinberg, Fleisher, and Hashimoto 2007.

RESEARCH ON PROGRAM- AND COURSE-LEVEL FEATURES AND INSTITUTIONAL REVENUE

Though no studies have yet explored the direct relationship between improvements in instructional quality and institutional revenue, there is a growing base of empirical literature on the financial impact of other course- or program-level interventions. Many of the studies discussed below examine the cost-effectiveness of interventions by comparing costs per output between treatment and control groups in randomized experiments. While most of the studies reviewed find that interventions are cost-effective in that they produce better outcomes per dollar spent, only a few have studied the impact of improved outcomes on revenue through mechanisms like increased retention, decreased course retake, decreased time-to-degree, or increased funding. Nonetheless, these studies begin to frame the relationship between interventions, outcomes, and institutional finances, and provide some methodological cues for the design of future research.

REMEDIAL COURSE AND PROGRAM REDESIGN

A number of scholars have studied the cost of remedial education and the financial impact of remedial course and program redesign. For example, Carol Twigg of the National Center for Academic Transformation (NCAT) has argued that remedial course redesign using blended learning maintains instructional quality, improves student outcomes, and increases cost-efficiency by transferring some instructional tasks to technology. Twigg proposes a cost assessment model that compares activity-based costs and ongoing operational costs in courses before and after the redesign, and has used the model to measure outcomes and savings at a number of two-year and four-year institutions. Using this model, Twigg found that costs decreased, on average, by 37 percent in redesigned courses, while learning outcomes increased in 72 percent of redesigns (Twigg 1999; Twigg 2005).[25]

Similarly, Manning et al. (2014) find that using a multiple measures method of placement and redesigning developmental math around one-credit-hour modules at Central Piedmont Community College (NC) and Davidson County Community College (NC) improved student success rates in remedial and gateway math and English courses. This led to increased credit accumulation and increased likelihood of retention and completion. While the redesign required substantial upfront, non-instructional costs, the authors argue that amortization of those costs will eventually yield a positive return on investment. Belfield et al. (2016b) find that co-requisite remediation at Tennessee Community Colleges increases gateway course pass rates, and despite increased upfront costs, is more cost-effective than traditional remediation. An NCAT analysis of the same reform at Austin Peay State University (TN) and Chattanooga State Community College (TN) found that the institutions improved outcomes while reducing costs through eliminating developmental math sections, staffing co-requisite support workshops with students, and reducing reliance on adjuncts (Crandall and Soares 2015).

25 Partner institutions include University of Wisconsin–Madison, Virginia Tech, Rio Salado College (AZ), University of Illinois Urbana–Champaign, and Rensselaer Polytechnic Institute (NY).

Most course redesign efforts incorporate the use of new learning modalities.

Photo courtesy of ACE member institution the University of Minnesota.

COURSE MODALITY

Most course redesign efforts incorporate the use of new learning modalities. For example, both NCAT redesigns and the North Carolina Community College System's redesigns incorporate hybrid or blended approaches into redesigned courses. Other studies propose that this change in learning modality, in particular, has the potential to increase efficiency. In a large-scale analysis of IPEDS data, Deming et al. (2015) find that—when controlling for institutional characteristics and geographic market, and using institution fixed effects—colleges and universities with a higher share of online students charge lower tuition prices, and real and relative prices for full-time undergraduate online education declined from 2006 to 2013.

While it is possible that this decrease in tuition per student is offset by a greater decrease in providers' costs per student or ability to scale, this study does not directly assess impact on institutional net revenue. Wu (2015) and Lack (2013) have reviewed empirical literature on the relationship between online learning and student outcomes and find that, in general, students who take online or hybrid courses generally perform no differently than peers in face-to-face sections. Yet, as Wu points out, there are few rigorous empirical studies of the institutional financial implications of increasing the use of online modalities in courses or programs (Wu 2015; Lack 2013).

FIRST-YEAR PROGRAMS

A final area of research on the financial impact of interventions focuses on first-year programs, which usually include mentoring or study skills courses, or combine a combination of interventions like remedial course redesign, intensive advising, and learning communities. Evaluations of these programs generally find that they positively affect metrics like retention, GPA, credit hour attempts and accumulation, completion, motivation, and social integration.

Some research has extended analyses of these performance impacts to measure cost-effectiveness and cost per outcome. For example, Belfield, Jenkins, and Lahr (2016a) find that both cost per degree and institutional net revenue improved when first-year Tennessee community college students were required to take 15 credits in their first semester instead of the normal 12. The increase in net revenue resulted from higher student persistence rates, and, the authors speculate, the lower institutional costs associated with providing courses in bulk (hence the "bulk-buying" discounts they offer to students who enroll in more credits)."

Researchers have also examined the cost-effectiveness of multi-pronged programs that use a mix of curricular and co-curricular interventions to improve outcomes. Sommo et al. (2012) evaluate a learning community program at Kingsborough Community College of The City University of New York (CUNY), in which groups of 25 students took three classes together in their first semester, received enhanced counseling and tutoring, and were provided textbook vouchers. They find that, compared to a control group, participants in the learning community had higher long-term completion rates and lower institutional cost per degree. Similarly, Scrivener et al. (2015) find that CUNY's Accelerated Study in Associate Program dramatically improved degree completion and cost per degree. The program combines redesigned developmental courses with mandatory full-time attendance, financial support, comprehensive advising, linked courses, a first-year seminar on study skills, and transportation and textbook vouchers.

Finally, a handful of studies propose and test models of the relationship between first-year programs and net revenue. Ketkar and Bennet (1989) use break-even analysis and an elasticity coefficient to propose a methodology for assessing whether the revenue generated by a freshman studies program justifies the investment.[26] They contend that, for an entering class of 1,000, a first-year program would only have to retain 21 students who would otherwise have dropped out in order to break even. Two studies from the 1980s and 1990s use estimations of program costs, increased retention rates, and increased tuition revenue from retention to calculate the financial impact of first-year programs. Gardner (1981) estimates that a freshman study skills course at Baptist Bible College (MO) has a 5.36 to 1 rate of return; Barefoot et al. (1998) estimate a 5.10 to 1 rate of return on a freshman mentoring program. These studies, while somewhat dated, provide useful methodological guidance for future studies of the impact of instructional improvement on retention and consequent net revenue.

26 Ketkar and Bennet 1989 were summarized in Cuseo 2010.

CASE STUDIES OF INSTRUCTIONAL IMPROVEMENT

As demonstrated by the variety of definitions of instructional quality and approaches to improvement, instructional improvement can be difficult to achieve and hard to measure. Efforts to improve instruction will be institution specific and depend on factors like institutional culture, leadership, faculty structure, and the types of students that the institution serves.

This section profiles four institutions of various types that have undertaken systematic efforts to improve instructional quality. We review two broad-access, four-year universities, University of Central Florida and California State University, Los Angeles; a community college, Valencia College (FL); and a small, liberal arts college, Mount Holyoke College (MA). In reviewing these institutions, we briefly describe the programs they have put in place and review descriptive evidence of their impact on instruction, student learning, student completion, and, if information is available, institutional costs.

UNIVERSITY OF CENTRAL FLORIDA

The University of Central Florida (UCF) is a public university of more than 64,000 students in Orlando, Florida. Of these, 33.5 percent are black or Hispanic, and 21 percent are eligible for Pell Grants. Over the past decade, UCF has increased enrollment by nearly 150 percent (with an increasingly diverse student body), grown its graduation rate to almost 70 percent, and kept tuition and fees at just over $6,000 per year.[27] In achieving these goals, UCF has focused on increasing instructional quality and capacity, and has ensured that efforts to scale are accompanied by a rigorous commitment to faculty development.

UCF has invested significantly in training faculty members to design and teach online or hybrid courses. UCF's Center for Distributed Learning, which manages this training, emphasizes reflection on pedagogy, a rigorous focus on learning objectives, and deep formative and summative assessment.[28] CDL's core offering is IDL 6543, an eight-week, 80-hour, blended-format faculty development program that is required for faculty from all disciplines who plan to create and teach original online or blended courses.[29] One of the key tenets of IDL 6543 is that an online course should not simply be a "conversion" of an existing course, but should instead involve taking apart and "rebuilding" the original course to achieve its learning goals with new teaching tools. In order to achieve these ends, each faculty member enrolled in IDL 6543 is paired with a trained instructional designer who serves as a coach during the training and continues to support the faculty member afterward. Faculty members are asked to reflect carefully on their teaching practice, learning outcomes, assignments, and assessment tech-

27 Data provided by the institution and from the National Center for Educational Statistics Integrated Postsecondary Data System.

28 See "Center for Distributed Learning," University of Central Florida, https://online.ucf.edu/about/, and Online@UCF, https://online.ucf.edu/.

29 CDL also offers more focused, less-intensive trainings for faculty who are taking over an existing online course. All information is based on research conducted for a case study on the institution. See Brown and Kurzweil 2015a.

niques. Faculty are also provided support—by their departments and by UCF's Research Initiative for Teaching Effectiveness (RITE)—to conduct research related to online teaching and learning.

UCF's focus on instructional quality in course redesign efforts has yielded promising results. Success rates (students earning a C or better) in UCF courses are remarkably high (above 85 percent) across all modalities, and students in online or hybrid courses have slightly higher average success rates than those in face-to-face courses.[30] These success rates have helped to increase completion: Between 2001 and 2014, UCF's six-year graduation rate for first-time, full-time students rose from 57 percent to 68 percent, and the five-year graduation rate for transfer students is nearly identical to that of first-time-in-college cohorts.

UCF's focus on online instructional quality and faculty development has also paid off in terms of student satisfaction. According to surveys administered by RITE, roughly 50 percent of students report being satisfied with their course regardless of course format. The main factor behind an "excellent" rating in every modality is the quality of faculty instruction: Ninety-nine percent of students who report that their instructor does an excellent job of achieving course objectives, creating an effective learning environment, and communicating ideas give the course an overall rating of "excellent."[31]

While UCF's investment in course design and pedagogical training appears to have kept quality high and outcomes strong, it has also improved net revenue. UCF's Office of Space Planning, Analysis, and Administration estimates that it would have cost $192 million to build the classroom space needed to offer UCF's online and blended courses in face-to-face formats, plus an additional $7.2 million per year for operations. Annual revenue generated by distributed learning course registrations, including tuition, state support, and an $18 Distance Learning Course fee totaled $176 million in fiscal 2015–16, representing a greater than 20.5:1 return on investment, excluding faculty salaries.[32]

Additionally, the flexibility of online learning affords students the opportunity to take increased course loads, shortening their time to graduation. For example, students who take 41–60 percent of their courses online complete in 3.9 years, versus 4.3 years for students who take only face-to-face courses. Online learning delivers up to 27 percent lower marginal cost per student credit hour based on the opportunity to accommodate higher class enrollments online, along with reduced building operation and maintenance costs.

CALIFORNIA STATE UNIVERSITY, LOS ANGELES

California State University, Los Angeles (Cal State LA) is a California regional comprehensive university and Hispanic-serving institution that serves undergraduates and graduates in Los Angeles

30 Based on aggregate data for 2008 to 2011, students in face-to-face courses had an average success rate of 87.7 percent and an average withdrawal rate of 3.1 percent. Students in fully online courses had a higher average success rate of 88.3 percent and a higher average withdrawal rate of 4.3 percent. Students in blended courses earn higher grades and are less likely to withdraw than students in either of the other modalities, with an average success rate of 90.8 percent and an average withdrawal rate of 2.8 percent. Information provided by Joel Hartman, vice president for information technologies and resources at UCF.

31 Information provided by UCF's director of institutional research.

32 Blended courses at UCF meet in classroom space roughly one-third as often as fully live courses. Information provided by Joel Hartman, vice president for information technologies and resources at UCF.

County. The university has the highest rate of social mobility of any college in the country.[33] From 2009 to 2016, total enrollment grew from 20,619 to nearly 28,000 students (60.9 percent of whom are Latino). During the same period, the six-year graduation rate increased from 34 percent to 45.8 percent.[34] Over the past several years, Cal State LA's Center for Effective Teaching and Learning (CETL) has grown significantly in its scope, reach, and impact, and has become a crucial lever through which the institution has sought to improve outcomes, especially for low-income or "non-traditional" students, now the typical college-going population in the United States.[35]

Currently, the CETL offers five types of short programs for faculty members, including tenured, tenure-line, and adjunct instructors. These programs include four-day, 32-hour course redesign workshops; two-day, eight-hour, active learning and mindful teaching workshops, 30 one-hour workshops on nuts and bolts topics like academic integrity, Moodle, and item writing; and faculty learning communities in which interdisciplinary groups of faculty members work on a common project or develop curriculum together. The center also works closely with the campus director of service learning to offer development on civic and service learning (a campus strategic initiative). All workshops are interdisciplinary and discipline-agnostic, and faculty receive course release and/or stipends for participation in learning communities and course redesign workshops. To date, 751 of Cal State LA's 1,554 faculty members have participated in one or more of these workshops, almost half the faculty body. Seventy-five percent of tenured or tenure-track faculty have completed programming.

Since 2012, CETL has received over $1 million in system and national grants to fund instructional development initiatives. It has most heavily invested in two intensive (long) programs aimed at increasing capacity. The first is an 11-week, 110-hour personalized program in which faculty build a hybrid course. Faculty work closely with an instructional designer and are guaranteed two sections of the course in a prime-time teaching slot. (This has helped maximize classroom space.) The second program, begun in 2016, is aimed at reaching lecturers; this program has attracted adjunct faculty not previously seen at the CETL. (The two-semester program is partly administered online, making access easier for instructors who teach on multiple campuses.) In both programs, faculty set personal teaching goals, then redesign the course using a unique Moodle template for blended and face-to-face courses. Participants in CETL's active learning workshop receive priority scheduling in one of the campus's new active learning classrooms.

Cal State LA has one of the largest first-generation student populations in the country.[36] In these short and long programs, the CETL has increased its emphasis on relationship-building, reflection, and

33 See Chetty et al. 2017.

34 Data from the Integrated Postsecondary Education Data System, National Center for Educational Statistics.

35 Like many institutions that have organized to effectively support these sorts of students, Cal State LA's instruction-based interventions frame these conditions not as student deficits. Rather, they take an approach that emphasizes the strengths that students bring to the classroom and addresses some of the institution's historical structural deficits (such as an emphasis on research) in leveraging these strengths to improve learning and outcomes. All qualitative information was provided by Catherine Haras, senior director of the Center for Effective Teaching and Learning. See "Center for Effective Teaching and Learning," Cal State LA, http://www.calstatela.edu/cetl.

36 See Kelchen's (2015) analysis of College Scorecard/NSLDS data.

self-regulation as crucial ingredients in effective teaching and learning, especially for first-generation and low-income students. This approach is most apparent in the CETL's course redesign, hybrid, and mindful teaching programs. The former has become a venue in which faculty rethink their teaching practices, as well as their curricula, incorporating a variety of affective and student-centered concepts shown to increase learning for low-income students.[37] In 2015, CETL began offering a two-day workshop on active learning and mindful teaching, in which participants build a research-based tool set for becoming more reflective and informed self-regulators of their own teaching practices.

There is some early evidence that working with the teaching center helps faculty improve student course completion rates.[38] The CETL has begun to assess the impact of cumulative faculty participation in professional development on student learning. For example, in 2014, the CSU Office of the Chancellor launched the Course Redesign with Technology initiative, which provides grants of up to $25,000 for faculty to use technology to redesign high-enrollment, bottleneck courses with non-completion rates of 25 percent or higher. Seventy-nine courses at Cal State LA received grants for redesign; in the first (2014) cohort, 22 of the 28 instructors redesigning these courses also worked closely with CETL. Of the 22 courses redesigned with CETL assistance, 17 had improved course completion rates. The CETL is in the process of measuring the impact of intensive (25 hours or more) development on faculty self-efficacy and student persistence.

VALENCIA COLLEGE

Valencia College is a five-campus community college in and around Orlando, Florida that served more than 60,000 students in 2014–15. Between 2005 and 2014, Valencia more than doubled the number of associate degrees it awarded through a combination of a large increase in degree-seeking students and a 10-point increase in its five-year completion rate. Improvements in fall-to-spring persistence rates, developmental education pass rates, credit-attainment, and transfer rates are equally impressive. Notably, Valencia has achieved these improvements in outcomes while keeping student costs exceptionally low: Over the past five years, Valencia's tuition has increased once, by a mere four dollars per credit hour.[39]

Valencia has achieved and scaled these improvements through a variety of initiatives that focus on improving the student learning experience. Valencia's strategic plan is based on "learning-centered goals" responsive to the needs and backgrounds of Valencia students.[40] Programs that have grown from this learning-centered approach include Supplemental Learning, which places peer mentors in

37 Changes in teaching practices or behaviors include an emphasis on more transparent teaching, explicitly connecting learning with personal experiences, and articulating the concept of care and mindful habits valued in the discipline, while common curricular changes (beyond incorporating technology) include designing student-centered syllabi, incorporating opportunities for peer learning, and designing curricula around problem solving.

38 See Condon et al. 2015.

39 All information here is based on research we conducted for a case study on Valencia College. See Brown and Kurzweil 2015b.

40 See "The Learning Centered Initiative: Collegewide Goals & Plans: Strategic Planning at Valencia," Valencia College, https://valenciacollege.edu/lci/plans.cfm.

upper level and developmental courses; Learning in Community, in which students take related or sequenced courses as a cohort and their instructors work together and with Success Coach to provide additional support; and a nationally recognized Learning Outcomes Assessment program.

Valencia's learning-centered focus is particularly apparent in its faculty development programs, which emphasize interdisciplinary collaboration, faculty-led innovations, and research and scholarship in teaching and learning. The institution's Office of Faculty Development was created in the early 2000s in response to Valencia's enhanced emphasis on student learning. One of the Office of Faculty Development's initial areas of focus was redesigning Valencia's tenure process to ensure that tenure-line faculty conducted research on teaching and learning and mastered Valencia's seven defined and research-backed educator competencies.[41] Under the current process, when a faculty member pursues tenure, she designs an individualized learning plan (ILP) through which she will develop each of these seven competencies through an action-research project.[42] In this project, faculty members implement changes in their teaching, evaluate the results of their changes, and write up their findings for review. In addition, faculty members must take 50 hours of professional development coursework related to their ILP, and work with a committee of senior faculty and facilitators to guide their progress on their ILP.

Beyond supporting the tenure process, the Office of Faculty Development offers a wealth of development opportunities for all faculty, including counselors and librarians. For example, Valencia's summer faculty development program, Destination, consists of workshops in which faculty and staff work with mentors to develop student-success projects based on several themes that align with campus-wide initiatives. These development experiences foster a community of practice in which faculty and staff share their own experiences with one another, work with faculty mentors, and collaboratively improve their teaching projects and practices based on a broad set of insights (Brown and Kurzweil 2015b).

Faculty development has a large footprint on Valencia's campuses. During academic year 2013–14, the Office of Faculty Development offered 383 courses in which 958 of Valencia's roughly 1,500 faculty members (both full and part time) participated in one or more courses. Of a sample of 102 associate, part-time faculty members surveyed about their faculty development experiences, 75 percent reported that the program helped them employ strategies to guide students to become active learners, and 100 percent strongly agreed or agreed that the program enhanced their knowledge of Valencia's seven essential competencies of an educator.[43] In surveys and feedback forms about their experience participating in Destination, participants report that the program had a significant impact on their teaching, their ability to perform action research, and their confidence using technology in the classroom.[44]

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41 These include assessment, inclusion and diversity, learning-centered teaching strategies, LifeMap, outcomes-based practice, professional commitment, and the scholarship of teaching and learning. For a more detailed explanation of the development of Valencia's unique tenure process and the Teaching Learning Academy, see The Aspen Institute 2014; see also the website for the Office of Faculty Development, Valencia College, http://valenciacollege.edu/faculty/development/.

42 See "Valencia's Tenure Process Components," https://valenciacollege.edu/faculty/development/tla/documents/TenureProcessNarrative_000.pdf, and "Action Research," Teaching/Learning Academy, Office of Faculty Development, Valencia College, https://valenciacollege.edu/faculty/development/tla/actionResearch/.

43 *Valencia Annual Faculty Development Report*, 2013–14, provided by Kurt Ewen.

44 Ibid.

Valencia's learning-centered focus has corresponded with increases in completion, persistence, and success at scale. For example, from 2005 to 2014, through a combination of enrollment increases and improvements to completion rates, Valencia increased from 926 to 2,007 the number of associate of arts degrees it awarded to degree-seeking students who completed within five years.[45] Many of these students transfer to UCF through a guaranteed transfer agreement, DirectConnect to UCF, and earn bachelor's degrees at rates comparable to students who began as first-year students at UCF.

MOUNT HOLYOKE COLLEGE

Located in Hadley, Massachusetts, Mount Holyoke serves just over 2,000 undergraduate women, about one-fifth of whom are Pell Grant recipients. Mount Holyoke maintains high four-year graduation rates—around 78 percent. With grant funding, it has invested in several initiatives focused on faculty development for high-impact and student-centered teaching practices.

Most of Mount Holyoke's faculty development programs are part of its Teaching and Learning Initiative. Programs include faculty learning circles; peer observations; monthly "talking about teaching" lunches; a program that pairs new tenure-track faculty with faculty mentors; write-onsite events; workshops on public intellectualism; and an annual Teaching Renewal week in which faculty participate in workshops focused on high-impact teaching practices, such as backward course-design, project-based learning, and the role of meta-cognitive factors in learning. The Teaching Renewal workshops are part of the Teaching and Learning Initiative's effort to become a campus hub for resources and development related to these sorts of pedagogical approaches. Most faculty participate in these programs voluntarily, and programs are particularly popular among Mount Holyoke's many new tenure-track faculty.[46] The Office of the Dean of Faculty, as well as the Nexus: Curriculum to Career office, also provides support for curricular development and faculty research (including grants, faculty seminars, and course development funds).

While they are still in the process of building up an institutional infrastructure to measure impacts, leaders at Mount Holyoke believe the development programs have had some cultural impacts—including increased engagement with high-impact practices and an increased investment in assessment. To assess the programs, Mount Holyoke will increase the Office of Institutional Research's role in course-level and program-level assessment, enhance collaboration with the Office of Student Success, and leverage its accreditation review self-study to produce evidence of the impact of its efforts.

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45 During this time, the number of first time in college, degree-seeking students grew from 3,873 to 5,926, and the five-year graduation rate for those students increased from 24 to 34 percent. See "Graduation Rates by Number of Mandated Areas: Fall Cohort FTIC Degree-Seekers over 5 Years," in the 2015 Valencia College report *Strategic Indicator Report: 2013-2014 Student Progression*. From 2005 to 2009, total degree-seeking students (all levels) grew from 23,691 (81 percent of all enrolled students) to 36,436 (84 percent of all enrolled students). See "Percent of Full-Time Students by Degree Intent (Fall Term Only)," also in *Strategic Indicator Report: 2013-2014 Student Progression*.

46 All information was provided by Elizabeth Markovits, director of the Teaching and Learning Initiative. See also the Teaching and Learning Initiative website: https://www.mtholyoke.edu/teachinglearninginitiatives.

CONCLUSION: NEXT STEPS FOR RESEARCH

As the cost of college grows and sources of funding of decline, college and university leaders face mounting pressure to find effective and efficient ways to improve their core business: educating and graduating students. Numerous studies show that research-based pedagogical practices and participation in faculty development can help institutions achieve these goals by increasing student learning, engagement, persistence, and degree completion. There is also evidence that improvements in retention increase revenue and have a positive return on investment. Other interventions—including remedial course redesign, increased course-taking in the first year, and more comprehensive first-year curricular and co-curricular reforms—have been shown to improve cost per degree.

Despite this supportive evidence, we are not aware of any study that directly evaluates the impact of improvements in instructional quality on net revenue. Our review reveals a few specific gaps in the literature. While there is evidence of the impact of retention and attrition on tuition revenue, models of the cost of recruiting new students are outdated. Evaluations of the revenue impacts of persistence programs are, for the most part, decades old, and their methodologies are not rigorously documented. There is very little empirical evidence on the financial impacts of other performance outcomes such as decreased course retake and time-to-degree. In particular, the impact of improvement in these outcomes on the costs of instruction, support, or facilities is unknown.

And while there is increasing attention paid to the cost per degree of various programs and interventions, these analyses rarely extend to actual cost savings or revenue generation. While cost per degree may be the most important metric from a societal perspective, for institutional leaders with a budget, the impact of a program on net revenue is also important.

In approaching this topic, researchers and college leaders should bear in mind a few considerations. First, net revenue should include a time horizon of at least several years. It is important to differentiate between up-front and ongoing costs, and to factor in potential returns to scale. Furthermore, the budgetary lens should be wide to observe tradeoffs. For example, an institution could invest a substantial amount in instruction and increase institutional net revenue because it cut costs in other areas of its budget while improving outcomes.

Researchers face several challenges in investigating this topic, and college leaders must overcome a number of obstacles to implementing and monitoring the financial effects of an instructional improvement strategy. Assessing instructional changes and their impacts on student outcomes and finances typically requires an integrated data warehouse that links student records, instructional expenditures, and data on mediating activities and outcomes. Many institutions are only just beginning to develop such data warehouses. Furthermore, efforts to train faculty members or monitor their instructional practices may be difficult where faculty have competing time demands, do not have strong incentives to focus on instruction, or view classroom instruction as their autonomous domain. When content and pedagogy are nonstandard across courses or institutions, it is difficult to develop valid and reliable assessments of instructional quality.

Finally, because student progression through college is mediated by many factors, isolating the impact of any single intervention on outcomes is difficult, even with robust study design. Connecting these

outcomes with institutional cost efficiencies and revenue generation, which can be measured in a variety of ways, is hardly straightforward, and demonstrating financial impact may require long-term planning and measurement.

Despite these challenges, a number of institutions have implemented interventions that have improved instruction and outcomes. The research reviewed here has documented such impacts, as well as the impact of changes in student outcomes on institutional finances. In short, there is a conceptual case, and some promising evidence, that an intervention that improves instruction while contributing to an institution's bottom line is possible. Because institutions are under increasing pressure to decrease costs while improving learning and increasing the rate of degree completion, these connecting links in logic and evidence deserve careful attention and further development.

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