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Against the Odds: The Impact of the Key Communities at Colorado State University on Retention and Graduation for Historically Underrepresented Students

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Against the Odds: The Impact of the Key Communities at Colorado State University on Retention and Graduation for Historically Underrepresented Students

Abstract

Learning communities are a high impact activity that can influence students' likelihood for success. Colorado State University (CSU) created the Key Communities (Key) program, which is open to all students but targets students that have persistently lower graduation and retention rates. The majority of Key students are under-represented (ethnically diverse, low-income, and/or first generation to college) and/or students with lower levels of academic preparation. This paper describes the structure and purpose of Key and shares the results of an institutional level assessment of Key's impact on graduation and retention. Since participation in Key is not randomly assigned, this analysis utilizes propensity score matching to estimate Key's treatment effect. Results show that Key has a positive impact on graduation and retention for all students, but Key is incredibly effective for students who come to CSU with characteristics that have historically put them at risk for attrition.

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Keywords

propensity score, underrepresented students, ethnically diverse, low-income, first generation to college, diversity, retention, graduation, quasi-experimental analysis, logistic regression

Introduction

Among all students enrolled at public 4-year institutions, about 80% are retained to the second fall semester and only 59% graduate within 6 years (Kena, et al., 2014). Students from underrepresented backgrounds (first generation, low income, and ethnically diverse) have even lower retention and graduation rates (Engle & Tinto, 2008). Furthermore, the retention and graduation gap for students from underrepresented backgrounds has increased significantly over the last 20 years (Kena, et al., 2014). In order to address the widening inequality in undergraduate success, interventions that are targeted for students who have been historically underserved by higher education must be considered.

As a high impact activity that can increase a student's likelihood to succeed (Tinto & Goodsell, 1994), learning community participation has a stronger positive impact for historically underrepresented students (Kuh, Kinzie, Buckley, Bridges, & Hayak, 2006; Zhao & Kuh, 2004) because students' critical first-year needs are addressed (Ward, Siegel, & Davenport, 2012; Lardner, 2004). Learning communities connect students to each other, to campus resources, and to intentionally integrated learning experiences that make a significant difference in students' persistence, learning, and views of themselves (Brownell & Swaner, 2010). However, due to a lack of culturally appealing activities (Hawkins & Larabee, 2009), underrepresented students typically do not choose to become involved in learning communities. Therefore, in order to be effective, programs must be designed specifically for these students.

Colorado State University (CSU) implemented the Key Communities (Key) in 1998 as a way to restructure the first-year experience, particularly for students from historically underrepresented populations. This paper describes the purpose, principles, and structure of Key, reviews an institutional level assessment of Key's impact on graduation and retention, and concludes with implications for learning community practice.

History and Purpose of the Key Communities

In the mid-1990s, CSU analyzed student retention and persistence data focused on the outcomes for underrepresented students. Similar to trends documented in postsecondary scholarship, this analysis revealed that students from underrepresented backgrounds are retained and graduate at lower rates than their peer groups. In response, we designed Key as an intervention strategy focused on the critical first year for all students and students most at-risk for attrition. Following established retention theory, Key is built on the premise that structured first-year programs are effective in helping underrepresented students succeed (Thayer, 2000).

Key is grounded in Tinto's (1994) theories on student retention, practices for a structured first year experience by Muraskin (1998) as well as concepts and lessons learned from the TRIO program. Established by the Higher Education Act of 1965, TRIO is successful in meeting the needs of first-generation and low-income students within the educational environment by providing a comprehensive, structured, specialized experience that supports educational access and retention (<http://www2.ed.gov/about/offices/list/ope/trio/index.html>).

Key creates a community with frequent and rewarding contact among faculty, staff, and students in a variety of settings, both inside and outside the classroom. Our approach follows the three domains of retention essential to first-generation student success: academic integration and the importance of reconciling the gaps between students' expectations and realities; personal and social integration to foster a sense of belonging; and cultural integration so students can quickly understand the values, norms, traditions, and beliefs of the campus culture (Ward, et al., 2012). Key's goals include increasing academic performance, increasing retention and graduation rates, fostering active engagement and campus involvement, increasing diversity awareness and understanding, and creating a sense of community and satisfaction among participants. Fundamentally, Key aims to increase retention and graduation rates beyond what would be predicted for students based on entering demographic and academic characteristics.

The Key Communities: Guiding Principles and Program Structure

Guiding Principles

Tinto (1994) asserts that programs must be committed to the students they serve, stating "the essential character of such communities lies not in their formal structures, but in the underlying values which inspire their construction" (p. 146). The overall structure of Key is inspired by four principles that are grounded in theory and serve as a prompt to guide decision-making and program growth.

Design with Diversity in Mind

Key is intentional about creating a positive educational experience with attention to underrepresented students, who comprise the majority of the Key student population. Strategies designed specifically for first generation and low-income students are likely to be successful for the general population, whereas strategies designed for the general population—without attention to underrepresented students—will often miss meeting their unique needs (Thayer, 2000). Because students are entering an environment that is drastically different from their own homes (Rendon, Garcia, & Person, 2004), designing with diversity

in mind addresses negative experiences such as low expectations, inadequate high schools, and perceptions that students are deficient while simultaneously offering an experience that is academically rigorous, compassionate, nurturing, empowering, liberating, and democratic (Rendon, et al., 2004).

Maximize Learning Opportunities

Key connects students to in- and out-of-class activities in a manner that does not isolate students' learning experience to any one realm. Organizing student learning across the curriculum and co-curriculum is a core tenet of learning communities, while building-in support for students academically and socially is a condition that promotes student success (Tinto, 2012). The community is grounded in the curriculum with intentionally designed co-curricular experiences that are essential for student learning (Smith, MacGregor, Matthews, & Gabelnick, 2004). Furthermore, because faculty design the integrated curriculum, deeper understanding of the course material emerges along with deeper connections with students and staff in the community (Shapiro & Levine, 1999).

Voice a Powerful Message

Muraskin (1998) discusses the importance of voicing a powerful message of success when structuring the first year of college for underrepresented students. Providing clear and consistent expectations on the requirements to succeed and holding high expectations for students' abilities to meet those requirements are additional conditions that promote student success (Tinto, 2012). In Key, the message to students is that they will be successful by attending class, participating in what is offered, and meeting all expectations.

Give Honest Feedback Early and Often

Key recognizes that student behaviors signaling potential difficulty need to be identified at the earliest possible time. Effective intervention is based on honest and timely feedback that informs students of their academic and social standing. It is also important to acknowledge that first-generation college students have less information and context about the university environment and expectations, so information and feedback is critical to success. Since the single most important means of establishing a connection at the university is to be attached to one person (Levitz & Noel, 1989), Key puts students in contact with mentors and full-time staff who care about them as a whole person, connect with them individually, and help them make the transition to and through college.

Program Structure

In addition to the four guiding principles, Key draws on research about successful program design. Levine and Shapiro (2000) state that effective learning communities share several basic characteristics:

...they organize students and faculty into smaller groups; encourage integration of the curriculum; help students establish academic and social support networks; provide a setting for students to be socialized to the expectations of college; bring faculty together in more meaningful ways; focus faculty and students on learning outcomes; and provide a setting for community-based delivery of academic support programs (p. 14).

Key is intentional about engaging students in the academic and social experiences of college, and the program is structured to maximize the level of engagement and integration that occurs. The 475 first-year students participate in one of five communities: Key Academic; Key Culture, Communication, and Sport; Key Explore; Key Health Professions; and Key Service. All five communities are grounded in the values of academics, leadership, diversity, service, and community. Each community ranges from 75–150 students, and each is further organized into smaller clusters of 19 students. The program also employs several additional critical strategies for promoting success.

Key Recruitment and Orientation

Since a high proportion of the population is first-generation to college, low-income, and/or ethnically diverse, Key implements a comprehensive and intentional recruitment process designed to involve students who are otherwise not likely to participate. Recruitment focuses on diverse student populations and emphasizes that the program is an honorary experience with high expectations.

Fostering a sense of community, communicating high expectations, orienting students to the expectations of Key, and acquainting students with peers, faculty, and staff are all frontloaded during a two-day Key Orientation prior to the start of the fall semester. This is an important, early step: students hear the message that they belong at CSU, and they are also oriented to the expectations of Key and the university experience.

A Shared Residential Experience

Kuh (2005) states that institutions that are serious about student engagement must structure the first year so students spend time with peers, preferably by living on campus. The residential component of Key is consistently rated as one

of the most beneficial aspects of the students' overall experience. All first-year Key students live together in a popular, renovated, and centrally located hall. This centrality puts students at the academic core of campus where they have access to faculty and staff offices, classrooms, the library, and the student center. Furthermore, a renovated hall provides the best financial option by keeping the prices affordable. Considerations like this minimize isolating students who may already be marginalized on campus. This design also illustrates how students' needs are in the forefront for decision-making about all aspects of the Key program.

Integrated Course Clusters and Key Seminar

The Key cluster structure is similar to learning community models that involve a freshman seminar with one to two university core curriculum courses that are unmodified in design (Smith, MacGregor, Matthews, & Gabelnick, 2004). The practice of course clustering helps mitigate isolation and enables students to make friends in an otherwise often impersonal setting (Muraskin, 1998). The term "cluster" defines each smaller cohort of 19 students in a shared curricular experience organized around a central theme. For instance, the Psychobiology course cluster is represented in Figure 1.

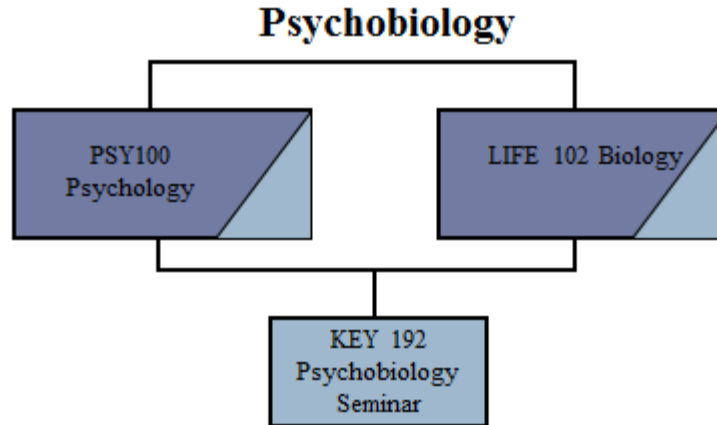


Figure 1 Psychobiology Cluster

In this cluster, Key students have seats reserved in Attributes of Living Systems (LIFE 102) and General Psychology (PSYCH 100) and are the only students enrolled in the Key Seminar course (KEY 192). The seminar is designed to help students integrate behavioral and biological understandings of the human experience and use these understandings to enhance their ability to make choices about their own behavior. Key Seminars are intended to be intellectually

challenging academic experiences, to foster substantive interactions between individual students and faculty and between and among student peers, and to teach basic competencies through active learning experiences that promote critical thinking skills.

Leadership and Staffing Model

The three critical staffing positions include undergraduate Key mentors, full-time Key coordinators, and Key seminar faculty. Key mentors are students who are in good academic and judicial standing, have experience working with diverse student populations, know about campus resources, and have strong interpersonal communication and academic skills. The full-time Key coordinators' primary responsibilities include supervising mentors, assisting with the development and implementation of the program, connecting students to campus resources and opportunities, and ensuring that the program activities are timely, high quality, and consistent with Key's intended goals and philosophies. In addition to developing and teaching the seminar, Key seminar faculty involve and supervise their assigned Key mentor as an undergraduate teaching assistant, conduct an orientation session with students during Key Orientation, and provide feedback on student performance.

Early Warning System

One method of providing early, often, and honest feedback to students is through an early warning and intervention system that gives students grade feedback and comments on their performance. Helping students stay on track by monitoring student progress enables them to take action before it is too late (Engle & Tinto, 2008). Key mentors use this feedback to facilitate a mid-semester conference with each student to discuss performance in classes, overall transition to the university, and creation of an action plan for learning effectiveness.

Traditions for Community Building

Finally, being intentional about fostering community in learning communities is important. Key does this in a variety of ways, including signature events where all 475 students come together in a community building activity. An example is Key Community Challenges, a day of field games, trivia, and sports during the fall semester, during which each cluster forms a team, designs T-shirts, and spends a few hours engaging in friendly competition. Finally, at the end of the academic year, Key sponsors a closing barbeque and awards celebration.

Research Purpose

Key's guiding principles and program structure are designed to maximize student learning and increase graduation and retention rates of students, specifically those from underrepresented backgrounds in higher education. The following section reviews an institutional level analysis that Key used to assess how well the program is meeting its goals. The purpose of this assessment was to provide evidence of Key's influence on retention to the second-fall (second-year retention) as well as longer term, bearing on eventual graduation. A common critique of first-year learning communities, like Key, is that they may impact retention to the second year, but that the positive experiences do not last through graduation. However, this study provides compelling evidence that Key does have an immediate impact on second-year retention and a lasting impact on eventual graduation.

Research Questions

This institutional-level analysis compares the second-year retention and graduation rates among first-time students who participate in Key compared to those who do not. Additionally, this study focuses on understanding the differential impact of Key for historically underrepresented students by identifying a statistically and substantively significant interaction between a student's likelihood to be in Key and the treatment effect of Key on graduation and retention. Therefore, two research questions guided this work.

1. Does participation in the Key Communities have a positive impact on a student's likelihood of being retained to the second year and graduating?
2. Does the impact of participating in Key vary based on a student's demographics and academic preparation?

Data

First-time, full-time students from the fall 2005 (FA05) through fall 2011 (FA11) cohorts are included in this study. All of these cohorts are included in the second-year retention analyses; however, the cohorts included in the graduation outcomes are limited by the time frame of having the opportunity to graduate in four, five, or six years. Students attain Key status by participating in Key during their first academic year. Over the seven cohorts included in this study, Key has grown 85%, and the total first-year student cohort size has grown 16%. On average, Key served about 7% of the total first-year student cohort. Appendix A

provides the cohort counts for Key and non-Key students during this study's time period.

Methodology

This study uses a combination of descriptive analyses to describe the demographics and academic preparation of Key and non-Key students as well as the observed graduation and retention rates. When proportions are compared, a chi-squared test is used to assess statistically significant differences and when means are compared a t-test is used.

To address the first research question, a propensity score analysis is used to estimate the treatment effect of Key on second-year retention and graduation. All analyses are completed using Stata version 10. This type of quasi-experimental analysis is necessary because students self-select (are not randomly assigned) to participate in Key, which introduces statistical bias to causal interpretations of observational data (Murnane & Willet, 2011). Propensity score matching allows for a comparison of demographically similar groups of students (Key/Non-Key) with the goal of understanding what the outcome would be for a Key student if he/she had not participated in the program. To estimate this counterfactual outcome, the propensity score approach uses a logistic regression model to calculate the probability that a student will be in Key based on a variety of academic and demographic variables. The probability of a student being in Key is his/her propensity score. The propensity score is then used to balance the dataset. In other words, every Key student is matched (based on having a similar propensity score) to a statistically similar non-Key student. The premise of this approach is that the matched non-Key students are a comparable control group to the Key students; therefore, the graduation or retention rates for these matched non-Key students are used to estimate the rates that would have been expected for a Key student if he/she had not been in Key (the counterfactual) (Guo & Fraser, 2010).

To address the second research question, a logistic regression is run on the balanced/propensity score adjusted data file with the propensity score, Key participation, and product of participation by propensity (interaction term) included as covariates and six-year graduation or retention as the outcome. The logistic regression model is then used to obtain the predicted probabilities of second-fall retention so that the difference in predicted probability by Key participation at every propensity level can be displayed graphically.

Variables

To obtain a propensity score for the likelihood of being in Key, a variety of demographic and academic variables are used in a logistic regression model that predicts Key participation. In terms of academic variables, the student's CCHE index (index) and college major are used. Index score, a measure of high school academic preparation, is a continuous variable specific to Colorado. This composite score is derived from high school GPA or high school rank and ACT or SAT test scores. More information regarding index can be found on Colorado's Department of Higher Education website (<http://highered.colorado.gov>).

CSU has eight academic colleges that are entered in the model as dummy variables with undeclared students as the reference category. The propensity score model also includes five demographic variables. Minority status is a binary variable, with minority students compared to non-minority (white, unknown ethnicity, and international) students as the reference category. First generation and Pell recipients are both compared to their respective reference group. First generation status is self-reported, based on the student's response to an admissions application question that asks if they are the first in their family to attend college. Pell recipient status is based on financial aid records for whether or not the student received a Pell grant his or her initial year. Residency represents whether or not the student was a Colorado resident (in-state) for tuition purposes during the initial year, and resident students are compared to the reference group of nonresidents. Gender is also included as a demographic covariate. Females are compared to the reference group of males. From prior institutional level analyses, all of these covariates are associated with graduation and retention.

Results

The results from this institutional-level assessment of Keys' impact on graduation and retention are presented in the following two sections. First, descriptive statistics of Key and non-Key students (prior to any propensity score adjustments) are discussed. The results of the propensity score analysis follow.

Descriptive Results

Demographically and academically, Key students are different compared to non-Key students. Appendix B presents the proportions of Key and Non-Key students across the academic and demographic variables included in the propensity score models.

As shown in Appendix B, the Key group includes statistically significant larger proportions of first generation, Pell recipient, minority, and female students compared to the non-Key group. There is not a statistically significant difference

in the proportion of Colorado residents across Key status. Appendix B also shows the lower average index score for Key students compared to non-Key students; the magnitude of this difference is very large. Additionally, Key students are more likely to enter CSU as an undeclared major compared to non-Key students.

Table 1 displays the observed second-year retention and graduation rates for Key and Non-Key students averaged over multiple cohorts prior to the propensity score adjustments.

Table 1

Unadjusted Graduation and Retention Rate Comparisons, Key Participants vs. Non-Key

	Second-Fall Retention ¹	4-Year Graduation ²	5-Year Graduation ³	6-Year Graduation ⁴
Key	88.7%	38.5%	60.8%	66.2%
Non-Key	83.2%	37.7%	59.9%	64.1%
Difference	5.53%	0.83%	0.84%	2.06%
N for Key / Non-Key	1991 / 27113	1000 / 15225	701 / 11254	408 / 7295

¹ Includes students from FA05 through FA11 first-time, full-time cohorts

² Includes students from FA05 through FA08 first-time, full-time cohorts

³ Includes students from FA05 through FA07 first-time, full-time cohorts

⁴ Includes students from FA05 and FA06 first-time, full-time cohorts

As shown in table 1, Key students are retained to the second year at a rate that is 5.5 percentage points higher than non-Key students ($\chi^2=44.3, p<.000$). However, Key graduation rates (4-, 5-, and 6-year) are not statistically different compared to the graduation rates of non-Key students.

Propensity Score Adjusted Results

As discussed in the methodology section of this report, propensity scores are used to create an appropriate comparison group of non-Key students. Appendix C contains the logistic regression coefficients for the models that are used to obtain the propensity scores. These models show that minority students, Pell recipients, and females have a positive association with Key participation. Index score is negatively associated with Key participation.

Research Question #1: Average Treatment Effect

Using the propensity score adjusted data set, the average treatment effect of Key is calculated by subtracting the graduation or retention rates for non-Key from the Key rates. Table 2 provides the graduation and retention rates for Key students and matched non-Key students.

Table 2

Propensity Score Adjusted Graduation and Retention Rate Comparisons, Key Participants vs. Non-Key				
	Second-Fall Retention	4-Year Graduation	5-Year Graduation	6-Year Graduation
Key	88.7%	38.5%	60.8%	66.2%
Non-Key	80.4%	37.1%	55.6%	56.4%
Difference (se) ^{1,2}	8.29% (1.14%)*	1.40% (2.17%)	5.14% (2.63%)*	9.80% (3.40%)*
N for Key/Non-Key	1991 / 1991	1000 / 1000	408 / 408	408 / 408
Additional Students Retained or Graduated	165	NA	NA	40

¹Average treatment effect among the treated, with standard error in parentheses

² * $p < 0.05$

Among the balanced data set that uses propensity scores to match non-Key student to Key students, Table 2 shows there is a gain of 8.3 percentage points in freshmen retention and increases in 4-, 5-, and 6-year graduation rates estimated at 1.4 percentage points, 5.1 percentage points, and 9.8 percentage points respectively. The second-fall retention, 5-year graduation, and 6-year graduation effect estimates are statistically significant.

A benefit of the propensity score research design is that it allows for the application of the average treatment effect to estimate the actual numbers of additional students retained or graduated because of the treatment (Key). Using an average treatment effect to causally infer additional students retained or graduated is a not uncommon application of propensity score analyses for program assessment at the institutional level (Keller & Lacy, 2013). With respect to this study, the 8.3 percentage point increase in second year retention resulted in 165 (.0829*1991) additional Key students from the FA05 to FA11 cohorts returning for their second year. Similarly, 40 (.098*408) additional students from the FA05 and FA06 cohorts graduated in 6 years because of their Key participation.

Additionally, the 9.8 percentage point increase in 6-year graduation rates can be used to estimate the impact Key has on CSU's overall graduation rate for the FA05 and FA06 cohorts. The FA05 overall cohort includes 3,807 students, with a Key cohort of 190; therefore, an additional 19 students (190*.098) graduated within 6 years from CSU because of their participation in the Key program. The 19 additional graduates increased CSU's FA05 overall rate by half of a percentage point (19/3,807)., The FA06 overall cohort is 3,971 students, with a Key cohort of 221; following the above logic, an additional 21 students graduated within 6 years from CSU because of their participation in the Key program. Key also increased CSU's FA06 overall rate by half of a percentage point.

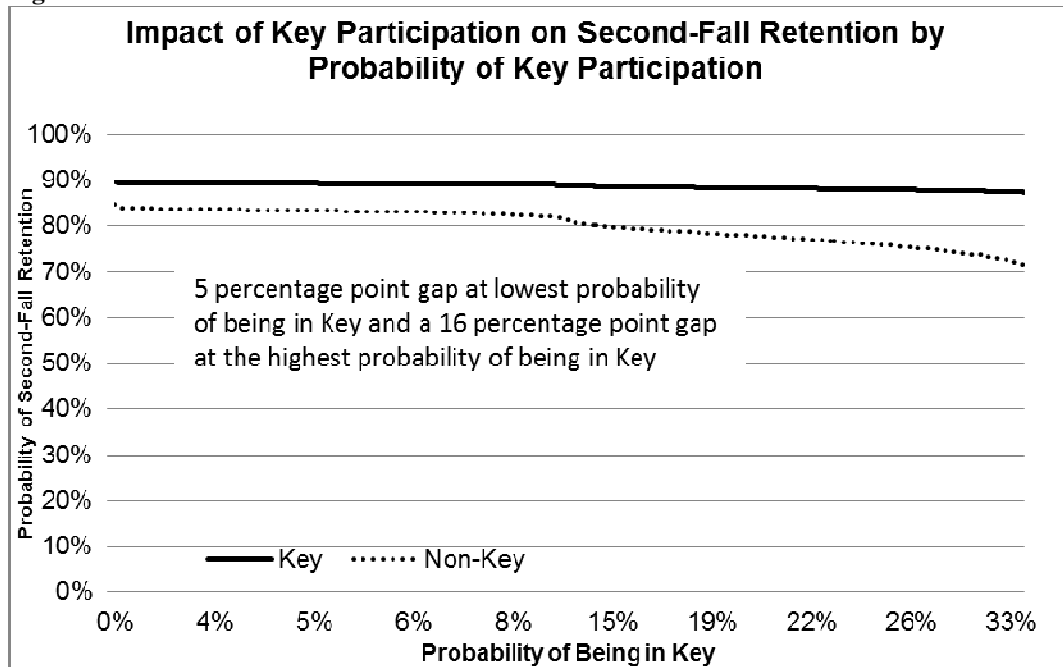
Since each student in the adjusted dataset has a propensity (probability of the likelihood) for being in Key, we can describe the group of students who are likely to be in Key and the group of students who are unlikely to be in Key. For instance, students with a low likelihood of being in Key have a higher than average index (116) and aren't very likely to be first generation, minority, or Pell recipients. Thus, the students with the highest propensity to be in Key are students

whose prior academic preparation and demographics are positively associated with attrition. Appendix D provides the descriptive statistics among students with the lowest (bottom quartile) and highest (top quartile) likelihood of being in Key.

Research Question #2: Differential Treatment Effect

The original purpose of Key is to decrease the graduation rate gaps for underrepresented populations. Therefore, it is also important to assess whether the treatment effect of Key varies based on a student’s likelihood to be a Key participant. Figure 2 graphs the probability of being retained for Key and matched non-Key students by their likelihood to be in Key.

Figure 2



The impact of the Key program is differentially higher for traditionally underrepresented students (those with the highest probability of being in Key). In figure 2, the x-axis shows the range of probabilities for the likelihood of being in Key, while the y-axis displays the probability of second-fall retention. Also shown in table 6, students with a low probability of being in Key are students with historically higher rates of success. For these students, the treatment effect of Key is relatively small. Participation in Key increases their probability of being retained by five percentage points. However, as a student’s probability of participation in Key increases, so does the treatment effect. For a student with a high likelihood of being in Key, there is a 16 percentage point increase in the

predicted probability of being retained to the second year. Key has a positive effect on graduation for all students; however, Key has a much larger effect for traditionally underrepresented students—those who are more likely/have the highest propensity to be in Key.

The effect of Key participation on graduation is also dependent on the likelihood of Key participation. Similar to the results shown in Figure 2 for retention, the gap in the predicted probability of graduating within 6 years between Key and non-Key students is smallest for students less likely to be in Key and largest for students most likely to be in Key.

Interpretations

Key students are more likely than the general population to be a minority, first generation, or a Pell recipient. Additionally, Key students tend to have lower levels of academic preparation. At CSU the retention rates for Key students are statistically higher compared to non-Key students; however, the graduation rates of Key students are very similar to non-Key students. This bivariate approach cannot be used to evaluate the impact of Key on graduation or second-year retention because it does not account for demographic and academic differences between Key and non-Key students. Therefore, propensity scores are used to match non-Key students to Key students in order to assess a treatment effect of Key on graduation or second-year retention. This is done by comparing the second-year retention or graduation rates of Key students to the second-year retention or graduation rates of the matched (demographically similar) non-Key students.

The more nuanced propensity score analysis is an important assessment tool in this study. Key serves students who typically have lower graduation rates. The observed graduation rates of Key students are similar to non-Key students, which (if demographics and academic preparation are ignored) could cause some to question the effectiveness of Key. The additional propensity score analysis allows us to identify a treatment effect of Key on participants, making a much stronger case for the program's efficacy. Additionally, calculating the treatment effect allows us to estimate the number of additional students retained/graduated because of the program and thus the impact of Key on CSU's overall retention and graduation rates. This type of evidence can be used to justify continued institutional support.

In summary, participation in Key appears to support student success by mitigating the negative effects of lower academic preparation and at-risk attributes on graduation and retention. Key has a positive effect on graduation and retention for everyone, but Key participation differentially impacts the likelihood

of retention and graduation for first generation, minority, and Pell recipients or students with lower levels of academic preparation.

Implications for Learning Communities Research and Practice

This study provides compelling evidence that Key has both an immediate and long-term impact on CSU student retention and graduation rates. It also has broader implications for learning communities' research and practice beyond our institution.

Retention and Graduation Rates

Learning communities are often implemented as a strategy to meet retention and graduation goals. Many programs have observed higher retention and graduation rates, yet attributing those positive outcomes directly to a learning community presents a challenge. For one, it is often hard to find an appropriate control group to compare the learning community treatment. Also, there is a question of self-selection bias, whether students who take advantage of the learning community are those who are most motivated and would have succeeded anyway. Given that learning community participation is posited to have greater impact on underrepresented students (Kuh, et al., 2006; Zhao & Khu, 2004), this study leaves practitioners and administrators with evidence of the positive impact that an intentionally-designed comprehensive learning community has on retention and graduation rates, particularly among students who have historically been the most at-risk for attrition. This outcome is important given institutions' concern with increasing retention and graduation rates as well as reducing graduation rate gaps among historically underrepresented students.

Considerations of Learning Community Design

Considerations of design are essential when using learning communities as an intervention strategy for student success. In this case, Key has statistically significant larger proportions of first generation, Pell recipient, and ethnically-diverse students. Designing a learning community for this population ensures that the intervention meets these and all students' needs. The design of Key responds to the research that suggests that a learning community that targets underrepresented students should scale down the overall college experience and provide personalized attention from dedicated staff (Engle & Tinto, 2008). Key is also effective because it harnesses equity-oriented pedagogical principles, is designed with diversity in mind, and does not marginalize students through being identified as a "minority serving" program *per se*. A future research trajectory is

to consider an in-depth qualitative and ethnographic analysis that captures the practices of Key and how all involved make meaning of the experience.

Scaling Up to Become an Institutional Intervention

Many programs in higher education begin as small-scale efforts reaching a few students. The success of such programs, as Key has realized, will beg the question of whether or not these smaller scale efforts can grow large enough to become institutional interventions. In this case, increasing Key by 85% since 2005 was accomplished in a way that maintained the principles and intensive structure, resulting in increased retention and graduation that positively impacts the overall graduation rates at CSU. Shifting away from the principles, structure, size, and intentionality that undergird smaller communities may dilute the overall impact on students; therefore, scaling up learning community efforts should proceed cautiously in ways that maintain the principles and comprehensive program structure.

Collaborations Between Institutional Research and Learning Communities

This study demonstrates the importance of collaboration between learning community leadership and other offices on campus, specifically Institutional Research. This type of collaboration is essential to develop research studies that can have important practical impact at the institutional level. In this case, it took expertise from both the Director of Key Communities as well as Institutional Research to design the current study. The results presented in this article have been extended to very practical applications at the institutional level. For instance, this study has been used to analyze a return on investment for Key. By estimating the tuition revenue generated from retaining students and factoring in the cost of running the entire Key cohort through the initial academic year, we have been able to show that the program pays for itself.

Because assessing learning community impact needs to remain central to the overall effort, collaborations with Institutional Research should be considered among learning community practitioners as a best practice. Such research is critical to the field of learning communities so that programs can continue to argue that the impact they have is not compensatory or ancillary but in line with institutional learning goals.

Conclusion

By most measures in higher education, the students who have the highest propensity to participate in Key are those who have historically been the most at-risk for attrition. They are the first in their families to embark on a college degree.

They are low-income. They are students of color at a predominantly white institution. These students often receive the least attention, are held to the lowest expectations, and are lost in systems that all too often support the majority group.

This study found that a learning community focused on underrepresented students has a positive impact on students' likelihood of being retained to the second year and graduating and that the impact varies based on students' demographics and academic preparation. Because Key appears to support student success by mitigating the negative effects of lower academic preparation and at-risk attributes on graduation and retention, traditionally underserved students benefit the most from participating. These results demonstrate added value to institutions that are concerned with not only the quality of the student learning experience but also outcomes related to retention and graduation, particularly among underrepresented students.

The students who participate in Key have beaten the odds by participating in an intentionally designed learning community that resulted in higher retention and graduation rates among all participants, with the greatest impact on those who have historically been the most at-risk for attrition. The real story of such communities, perhaps, may not be in the numbers. The real story may lie in the reality that this community is serving as a cultural home for students who all too often are found at the margins, and not the center, of the university experience.

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Appendix A

Count of First-time, Full-time Students by Cohort Term

	FA05	FA06	FA07	FA08	FA09	FA10	FA11	Total
Non-Key	3,617	3,750	3,994	4,006	3,903	4,028	4,068	27,366
Key	190	221	294	302	300	341	351	1,999
Total	3,807	3,971	4,288	4,308	4,203	4,369	4,419	29,365

Appendix B

Descriptive Statistics of Key and Non-Key Populations

	Key	Non-Key
First Generation (%)*	38%	25%
Pell Recipient (%)*	32%	16%
Minority (%)*	45%	13%
CO Resident (%)	81%	79%
Female (%)*	64%	55%
Undeclared (%)*	33%	27%
Index (average)*	111	114

* $p < .05$

Appendix C

Logistic Regression Coefficients for Key Community Participation

	Retention Cohorts ¹	4-Year Graduation Chorts ²	5-Year Graduation Chorts ³	6-Year Graduation Chorts ⁴
	<i>b(se)</i> ⁵			
Minority	1.47 (0.05)*	1.42 (0.07)*	1.40 (0.09)*	1.49 (0.11)*
First Generation	0.20 (0.05)*	0.06 (0.07)	-0.02 (0.09)	-0.01 (0.12)
Pell Recipient	0.43 (0.06)*	0.32 (0.09)*	0.25 (0.10)	0.29 (0.13)
CCHE Index	-0.01 (0.00)*	-0.02 (0.00)*	-0.02 (0.00)*	-0.02 (0.01)*
CO Resident	-0.06 (0.06)	-0.23 (0.08)	-0.25 (0.10)	-0.27 (0.13)
Female	0.27 (0.05)*	0.44 (0.07)*	0.55 (0.09)*	0.68 (0.12)*
College Major at Entry				
Ag. Sci.	-0.42 (0.13)	-0.16 (0.17)	-0.15 (0.21)	-0.39 (0.30)
App. Human Sci.	-0.25 (0.08)	-0.19 (0.12)	-0.05 (0.13)	-0.08 (0.18)
Business	-0.02 (0.10)	0.32 (0.14)	0.35 (0.17)	0.23 (0.22)
Engineering	-2.81 (0.32)*	-2.87 (0.58)*	-2.32 (0.59)*	-2.10 (0.72)
Lib. Arts	-0.02 (0.07)	0.17 (0.10)	0.24 (0.12)	0.22 (0.16)
Natural Sci.	-0.06 (0.07)	0.14 (0.10)	0.07 (0.13)	-0.07 (0.17)
Vet. Med.	-0.05 (0.13)	0.15 (0.17)	0.09 (0.20)	-0.21 (0.27)
Natural Resources	0.20 (0.14)	0.72 (0.18)*	0.90 (0.20)*	1.17 (0.24)*

¹ Includes students from FA05 through FA11 first-time, full-time cohorts² Includes students from FA05 through FA08 first-time, full-time cohorts³ Includes students from FA05 through FA07 first-time, full-time cohorts⁴ Includes students from FA05 and FA06 first-time, full-time cohorts⁵ Cells display the regression coefficient with its standard error and an asterisk to indicate that $p < .05$

Appendix D

Descriptive Demographics of Students by their Likelihood of Participating in Key

	Average Index	Percent First Generation	Percent Minority	Percent Pell Recipients	Percent Female	Percent Resident	Three Most Likely Colleges
Lowest likelihood of being in Key (bottom quarter)	116	11%	1%	1%	46%	76%	Undeclared (24%); Natural Sciences (19%); Liberal Arts (17%)
Highest likelihood of being in Key (top quarter)	106	67%	100%	73%	75%	87%	Undeclared (44%); Natural Sciences (22%); Liberal Arts (17%)