CCRC COMMUNITY COLLEGE RESEARCH CENTER

TEACHERS COLLEGE, COLUMBIA UNIVERSITY

Leadership for Transformative Change: Lessons From Technology-Mediated Reform in Broad-Access Colleges

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August 2015

CCRC Working Paper No. 83

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This research was funded by the Bill & Melinda Gates Foundation. The authors are grateful to Davis Jenkins and Jim Jacobs for their helpful feedback, and to Amy Mazzariello for her skillful editing. Hoori Santikian, Jeff Fletcher, and Marisol Ramos were instrumental in data collection and analysis.

Abstract

Community colleges and broad-access four-year institutions have a crucial role to play in increasing educational equity in the United States. In order to fulfill this role, however, institutions must engage in organizational change to address their low completion rates. Drawing on qualitative case studies of six colleges, this study explores the influence of different types of leadership approaches on the implementation of a technology-mediated advising reform, and assesses which types of leadership are associated with transformative organizational change. Expanding on Heifetz's theory of adaptive change and Karp and Fletcher's Readiness for Technology Adoption framework, we find that transformative change requires multitiered leadership with a unified commitment to a shared vision for the reform and its goals.

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1. Introduction

Community colleges and broad-access[1] four-year institutions are key vehicles for expanding access to higher education for those who have historically been excluded. Low-income, first-generation, and racial/ethnic minority students all attend community colleges at higher rates than do students who come from higher income families, have parents who completed college, and are White (Berkner & Choy, 2008; National Center for Public Policy and Higher Education, 2011). Likewise, broad-access four-year colleges serve more low-income and minority students than do more selective four-year colleges (Crisp, Doran, & Reyes, 2014).

However, while expanding college access is an important and necessary goal, it is not sufficient to ensure student success. Students do not fully realize the benefits of college access unless they complete a degree or other credential. Students may see an increase in earnings even without completing a credential, but returns to education are highest for those who do (Belfield & Bailey, 2011; Oreopoulos & Petronijevic, 2013; Zeidenberg, Scott, & Belfield, 2015). Additionally, students who drop out of college (both four-year colleges and two-year colleges) have higher unemployment rates and are more likely to default on their student loans than students who complete college (Nguyen, 2012).

In general, the less selective a college is, the lower its graduation rate is (Hess, Schneider, Carey, & Kelly, 2009). According to the most recent completion data, only 39 percent of first-time community college students who enrolled in 2003–2004 had received a two- or four- year credential after six years (Shapiro, Dundar, Yuan, Harrell, & Wakhungu, 2014). This is comparable to the 39.6 percent six-year graduation rate calculated by Hess et al. (2009) for students attending colleges classified as "less competitive."[2]

For several years, policymakers, researchers, and foundations have been calling attention to the challenges posed by low college completion rates and emphasizing the

[1] Doyle (2010) defines "open-access, nearly open-access, and nonselective institutions" as "public four-year colleges and universities that admit at least 80 percent of applicants." The term "broad-access" is used in this paper to refer both to those public four-year institutions and to community colleges, which are by definition open admission.

[2] Hess et al. used classifications from Barron's, which defines less competitive colleges as those that (1) have median test scores below 500 on the SAT and 21 on the ACT, (2) require some type of entrance examination but do not report scores, (3) admit students whose high school grades were below C on average and who ranked in the top 65 percent of their class, and (4) admit 85 percent or more of applicants.

urgent need for reform (Bound, Lovenheim, & Turner, 2010; Executive Office the President, 2014; Lumina Foundation, 2014). Yet most reforms to date have not made systemic changes, nor have they meaningfully increased completion rates. Thus, there is growing recognition of the need for large-scale "fundamental redesign" (Bailey, Jaggars, & Jenkins, 2015; Brock, 2010; Crow & Dabars, 2015; Karp, 2013).

Advising and counseling services are increasingly being viewed as a critically important piece of this type of redesign (Bailey et al., 2015; Center for Community College Student Engagement, 2013; Jenkins & Cho, 2014; Mayer et al., 2014; Nodine, Jaeger, Venezia, & Bracco, 2012). Given the multitude of course offerings and the complexity of certificate, degree, and transfer requirements at most broad-access colleges, advisors have a crucial role to play in supporting students. Adding to the difficulty of navigating a complex system, many students enter college academically underprepared, undecided on a program of study, and uncertain of their career goals. To address these needs, ideally, academic advising should be a holistic teaching and learning process linking students' interests to education and career planning (Global Community for Academic Advising, 2006; Habley, Bloom, & Robbins, 2012).

However, advising departments are typically small, with extremely high student-to-advisor ratios (Bailey et al., 2015; Jaggars & Fletcher, 2014; Karp, 2013). As a result, most advisors can afford to do little more than provide basic information and register students for courses. They rarely have time to engage in long-term education planning, discuss career goals, or provide comprehensive support for at-risk students. The high student-to-advisor ratios also make it difficult to give advisors assigned caseloads, meaning that students rarely have the opportunity to meet with the same advisor consistently over time and often receive conflicting information from different advisors (Karp, 2013). Most students' introduction to college involves only a brief orientation, with an emphasis on placement testing and registration for the upcoming semester (Bailey et al., 2015; Jaggars & Fletcher, 2014; Karp, 2013).

Recently, technology-mediated advising , sometimes referred to as e-advising or Integrated Planning and Advising Services (IPAS), has emerged as a means of reforming advising and providing more robust student support. The majority of IPAS systems observed for this study fall into three general categories: (1) education planning systems,

which provide tools for selecting programs and courses, mapping degree plans, and tracking progress toward degree completion; (2) counseling and coaching systems, which provide tools for improving students' connections to support services; and (3) risk targeting and intervention systems, which provide tools for monitoring early indications of academic struggle. In sum, IPAS systems are designed to address the most immediate challenges to student success, providing effective program planning that connects to holistic support to promote students' progress toward a degree.

In order for IPAS systems to achieve their goal of supporting more students through to completion, institutions and end users[3] must adopt these systems in ways that transform advising from clerical registration tasks to the type of holistic case-management support described above**.** To do so requires *transformative change* at three distinct levels of organizational functioning—structural, process, and attitudinal. We define *structural change* as changes to the design of systems and business practices. We define *process change* as changes in individual engagement and interpersonal interactions with systems and business practices. Finally, we define *attitudinal change* as changes in core underlying attitudes, values, and beliefs.

To illustrate the interaction between these three levels of change, we use the example of a college moving from a non-required, first-come-first-served system of drop-in advising to a mandated system of assigned advising based on program of study. We would consider any changes to the overall system or model of advising (introduction of the mandate, assignment of specific students to specific advisors, allocation of additional funds to hire more advisors, lengthening of advising appointments, etc.) to be structural changes. If advisors then began using advising appointments to interact with students and facilitate their education planning differently (for example, focusing on linking education and career goals or on mapping out courses for an entire degree, rather than just selecting courses for the upcoming semester), we would consider that a process change. Finally, if advisors began viewing themselves as case managers rather than registration clerks, or if they gained a new sense of responsibility for monitoring and following up with individual students, we would consider that an attitudinal change.

[3] We define an end user as anyone whose job involves using IPAS technology on a routine basis.

In order for change to be transformative, we propose that change at all three levels is necessary. If structural change occurs in the absence of process and attitudinal change, individuals may not behave differently (advisors could still use scheduled appointments solely to register students for the next semester's courses). If process and attitudinal change occur in the absence of structural change, institutional functioning may not improve (advisors could use single drop-in appointments to work on long-term education planning with students, and could believe in the importance of providing holistic support, but without the structure of mandated advising or assigned caseloads, they may not have the opportunity to follow up with the same students over time). Thus, the design of systems and business practices must change in conjunction with the practices and attitudes of individuals. This multidimensional definition of transformative change aligns closely with other definitions found in the literature on organizational change, particularly Kezar's (2014) framework for change in higher education.

The complexity of such a wide-ranging organizational reform makes leadership a particularly essential part of the change process; Kezar (2014) even asserts that leadership may be "the most important facilitator" of change (p. 108). To understand how leaders can best support changes in structures, processes, and attitudes within the context of higher education, we developed a theoretical framework based on Heifetz's (1994) theory of adaptive change and Karp and Fletcher's (2014) Readiness for Technology Adoption (RTA) framework. We use qualitative case studies of six colleges that had already decided to invest in technology-mediated advising but were still engaged in the early stages of implementing and adopting the technology to address the following research questions: (1) What do colleges' early implementation plans and experiences reveal about the potential for technology adoption to drive transformative change? (2) How do different approaches to college leadership influence technology adoption and transformative change?

In the sections that follow, we first review the literature on leadership for change management, both generally and within the context of higher education, as well as the literature on technology-mediated reforms in higher education. We then provide an overview of the theoretical framework used for our analysis and a detailed description of our methods and data sources. Finally, we present our findings and discuss their implications for colleges. Unlike other studies of college leadership, this study focuses on

how the relationship between different levels of leadership engaged in technology-mediated reform broadly influences institutional functioning. Overall, we find that transformative change requires multitiered leadership with shared priorities and a unified commitment to the goals for the reform. Only one of the six colleges we studied started off with that kind of alignment between institutional-level and project-level leaders, but leaders at two of the other colleges developed a common understanding of how IPAS could be used to support larger institutional reforms through the process of implementing the technology. Upper level institutional leaders and mid-level project leaders both had important roles to play in fostering the alignment of their approaches to change and in driving technology-mediated reform, but the role of mid-level project leaders was particularly vital and complex.

2. Background

2.1 Change Management

Scholars have been attempting to define the characteristics of effective leaders for over a century (Judge, Bono, Ilies, & Gerhardt, 2002). Over this period, some of the commonly cited conceptualizations of leadership have included the "great man"/charismatic leader theory, trait-based theory, situational leadership, and theories of "bad" leadership (see Avolio, 2007; Bennis, 2007; Hogan & Ahmad, 2011; Judge et al., 2002). Many of these theories were developed based on the assumption that leadership is a function of formal authority structures. Beginning in the mid-1950s, however, organizational leadership theorists started decoupling the concept of leadership from official positions and titles, instead emphasizing relationships with followers and the ability to influence change (Gates & Robinson, 2009). Since the early 1990s, theorists have differentiated between leadership and authority in their discussions of change management, the process of facilitating change in both individual practice and organizational functioning (Heifetz, 1994; Kotter, 1996; Senge, 1990). These theorists have asserted that virtually anyone can serve as a leader if they have the capacity to mobilize others to enact lasting change.

For example, Kotter (1990, 1996) distinguishes between managers and leaders: Managers have the authority to create and maintain structures that promote "order and consistency," whereas, leaders "cope with change" by motivating people to work together to achieve a common vision. Kotter argues that managers and leaders each have distinct roles to play and must work in concert because strong managers "can turn bureaucratic and stifling, producing order for order's sake" in the absence of strong leaders, while strong leaders "can become messianic and cult-like, producing change for change's sake" in the absence of strong managers (1990, pp. 7–8). Furthermore, Kotter (1990) asserts that when managers and leaders share a common vision, leaders without managerial authority are perceived as having greater legitimacy and thus have a greater ability to enact change.

Likewise, Heifetz (1994) organizes his conception of leadership around the difference between authority and leadership. According to Heifetz, leaders face two distinct types of challenges: technical problems and adaptive problems. Technical problems have known solutions, while adaptive problems have no known solutions and therefore require changes in thinking and values (Heifetz, 1994; Heifetz, Grashow, & Linsky, 2009). While an authoritative approach, based on a clear hierarchy and commands, is likely to be effective for addressing technical problems, it is insufficient for coping with adaptive problems. Adaptive change requires leaders who can motivate people to engage in difficult conversations and to think and act differently (Heifetz, 1994; Heifetz et al., 2009).

2.2 Leadership in Higher Education

Mirroring trends in general leadership research, much of the literature on community college leadership explores positions of formal authority—college presidents and other high-level administrators (American Association of Community Colleges, 2013; Eddy, 2003, 2005; Malm, 2008; Nevarez & Wood, 2010, 2012; Pope & Miller; 2005; Riggs, 2009). A smaller number of studies have highlighted role of mid-level college leaders, but this literature also frequently describes leadership as a static function based on title, rather than a dynamic process of managing change (McArthur, 2002; Rosser, Johnsrud, & Heck, 2003; Wolverton, Gmelch, Montez, & Nies, 2001). Mid-level leaders are often discussed in the context of typical career trajectories from mid-level

positions, such as departments chairs, to college presidencies (Amey, VanDerLinden, & Brown, 2002; Bisbee, 2007; Mitchell & Eddy, 2008; Riggs, 2009).

Given the urgent calls for higher education reform, a growing body of literature is defining college leadership more broadly by applying theories of change management to higher education. Several recent studies build on the change management literature's core tenet of leadership as a multidimensional phenomenon dependent on motivating and engaging others rather than on exercising authority. For example, Jenkins, Kadlec, and Votruba (2014) tailor Heifetz's theory of adaptive leadership to the challenges involved in reforming the transfer process between two- and four-year institutions, emphasizing the importance of managing the "human side of change" by building a broad, cross-institutional network of support. Lick (2002) focuses on different roles related to change in higher education by applying Conner's (1993) classification of the types of roles involved in change in corporate settings. *Change sponsors* authorize change. *Change agents* enact change. *Change targets* are asked to do things differently. Finally, *change advocates* champion change and garner buy-in. Both Conner and Lick stress that all four roles must work in concert in order to achieve change.

Kezar (2011, 2014) similarly argues that "second-order" or deep change, as opposed to "first-order" or minor change, occurs in higher education through collaboration between multiple levels of leadership from across an institution rather than through top-down mandates based on traditional hierarchies. Concentrating on what they describe as the often-overlooked role of informal leadership in higher education, Kezar and Lester (2011) examine how grassroots leaders without formal authority bring about change in a variety of institutional settings, including a community college, a technical college, and a public regional college. They find that grassroots leaders are most successful in bringing about change when they are able to connect the reason for the change to the mission and values of the institution and actively engage others in understanding why change is necessary. In subsequent work, Kezar (2014) discusses the value of upper administration's role in change, advocating for shared leadership between high-level and grassroots leaders. Grassroots leaders have the legitimacy with their peers to obtain widespread buy-in for change, while upper administrators control structural elements, such as reward systems and budgets, that are conducive to institutionalizing

change (Kezar, 2014). Resource control is a crucial component of upper administration's role in change, particularly at resource-constrained community colleges and broad-access colleges. However, the general change-management literature tends to ignore the impact of financial resources on capacity for change.

In addition to examining individual leadership roles, the literature on change in higher education builds on traditional theories of change management by examining the role of institutional culture. For example, Jenkins et al.'s (2014) model for developing new transfer pathways includes recommendations for creating a "culture of transfer" based on Collins and Porras's (1994) theory of "organizational alignment"—the process of uniting organizational structures and ideologies around common goals. Expanding on Senge's (1990) classic theory of the learning organization, multiple authors have written about the need to foster learning cultures on college campuses in order to promote change (Amey, 2005; Lick, 2002). Shugart (2013) discusses the need for "culture-changing leadership" that interrogates strongly embedded values and practices by speaking to "the heart," not "just the business" of higher education (p. 14). Kadlec, Immerwahr, and Currie (2013) identify seven practices employed by leaders at a broad-access university to cultivate an institutional culture that supports innovation and change. Bailey et al. (2015) highlight similar leadership practices that are effective in reshaping institutional culture around reform, such as building trust, acting with integrity, addressing challenges openly, and demonstrating respect.

2.3 Technology in Higher Education

Overall, the literature on the role of technology in higher education reform tends to portray the technology *as* the reform. A number of recent books have examined technology as a major structural change to the design of higher education. Advances in online education have been portrayed as a solution to the rising cost of postsecondary education and a means of improving access to higher education (Bowen, 2013; Carey, 2015; Craig, 2015), with the assumption that expanding access through technology will enable more people to complete college degrees. Yet other research has shown that community college students receive lower grades in online courses and are less likely to complete online courses compared to in-person courses (Jaggars, 2013; Xu & Jaggars, 2013).

Focusing even more narrowly on technology as a tool, rather than as a vehicle for substantive change in education practice, some literature strictly examines how technology is incorporated into instruction and used to manage student information. For example, since 1990, the Campus Computing Project's annual survey about the role of technology in higher education has primarily explored the availability and use of different technologies on college campuses. In the 1990s, the cutting-edge technology was email and the Internet; today, it is learning-management systems and mobile apps (Campus Computing Project, 1994, 2010). The surveys provide a great deal of insight into how technology changes and evolves, but not into how using technology can improve student success.

Another strand of the literature on technology in higher education explores the individual and organizational characteristics that are related to the likelihood of adopting new technology. Many of these studies apply Rogers's (2003; originally published 1962) classic diffusion of innovation model to understand why technology is used or not used (Ahmed, Daim, & Basoglu, 2007; Shea, Pickett, & Li, 2005; Soffer, Nachmias, & Ram, 2010). Others examine the role of organizational culture in technology adoption (Jackson, 2011; Twigg, 2000). However, as Hall (2010) rightly notes, this literature often assumes that adoption will necessarily lead to improved outcomes. Very little literature has addressed the mechanism by which technology adoption is expected to impact college completion.

One notable exception is the Readiness for Technology Adoption (RTA) framework (Karp & Fletcher, 2014). The RTA framework begins with the premise that technology can be used to fundamentally redesign the student experience in ways that promote student success. However, it argues that that technology in and of itself will not lead to significant changes; colleges must approach the implementation of that technology as a means of changing practice. The RTA framework assumes there is a difference between implementing technology (installing technology systems) and adopting technology (using technology in everyday practice). It identifies the antecedents of successful technology adoption within institutions and assesses whether technology adoption is likely to lead to transformative change. The framework identifies four broad areas of organizational readiness: technological, cultural, institutional, and project-level. Organizations must be both technologically and culturally ready to adopt a new technology, and both technological and cultural readiness must occur at two distinct

levels simultaneously, the institutional level and the project level (Karp & Fletcher, 2014). Cultural readiness is complicated by the fact that organizations are made up of groups of individuals, or microcultures, with differing perceptions and propensities to adopt new technologies (Karp & Fletcher, 2014).

In exploring how multiple levels of leadership at community colleges and broad-access colleges approach the introduction of technology-mediated advising systems, the current paper combines the literature on higher education reform and technology adoption. Technology is typically viewed as an information technology (IT) department issue, but expanding the leadership analysis to include multiple levels of leaders from across departments provides a more in-depth understanding of how technology impacts institution-wide change. The intersection between higher education reform and technology adoption is particularly important now, when much attention is being given to the role of technology in higher education and the role of community colleges and broad-access colleges in improving completion rates.

3. Theoretical Framework

In order to make the concept of leadership more applicable to technology reform in higher education, we use the same distinction as Karp and Fletcher (2014) and Kezar (2014). We differentiate between institutional-level and project-level functioning, focusing on both college-level leadership (e.g., president, vice president, provost), which Kezar refers to as "upper administration," and project-level leadership (e.g., directors or coordinators charged with project implementation), which Kezar refers to as "mid-level leadership." This framework encourages us to focus on multiple leaders within each case study site, rather than a singular or titular project leader.

We also draw from Heifetz's (1994) theory of technical versus adaptive change in order to understand individual leaders' approaches to reform. Heifetz organizes his conception of leadership around two central dichotomies—authority versus leadership, and technical versus adaptive problems. Using this lens helps highlight whether leaders view technology-based reform as a problem of technology or of transformation. By definition, transformative change is adaptive—there are no easy solutions or clear

roadmaps for changing structures, processes, and attitudes, and these types of changes are not likely to occur through authoritative mandates alone. Although low college completion rates and overburdened advising services fall squarely into the category of adaptive problems, it is unclear whether higher education leaders view IPAS as a means of making the kinds of transformative changes necessary to solve these problems.

We hypothesized that leaders who had a limited vision of the reform's benefits, focused on technological efficiency, were primarily viewing the implementation of IPAS as a technical problem. We further hypothesized that these leaders would take a technically focused, authoritative leadership approach that did not involve major changes to underlying structures or processes. On the other hand, we hypothesized that those with a broader vision of the benefits of IPAS systems, linking them to advising reforms, would view implementation as an adaptive challenge requiring major changes to structures, processes, and attitudes.

Used together, Karp and Fletcher's RTA framework and Heifetz's (1994) theory of adaptive change offer a way of assessing why some leaders may be more effective in encouraging transformative change through IPAS than others. The RTA framework allows for a nuanced analysis of the types of institutional-level and project-level tasks required for leaders to successfully manage a technology implementation. At the same time, Heifetz's theory provides a means of moving beyond traditional leadership typologies to concentrate on how leadership affects change. Combining both frameworks suggests that change is more likely to be lasting if it is championed by multiple levels of leadership with a shared vision for adaptive change.

4. Method

We used a contrasted case study design with six sites that were part of a larger group of colleges selected to receive a grant dedicated to implementing IPAS technologies. Thus, while colleges often struggle to secure the financial resources necessary for acquiring and supporting new technologies, the colleges we studied had already received external funding and committed internal resources to IPAS. Given the nature and timing of the grant, we were not examining how college leaders decide

whether to purchase a new technology, nor were we studying how leaders maintain financial support for a new technology over the long term. Rather, we focused exclusively on the role of leadership in technology implementation, the process of getting a new technology up and running, and promoting end user adoption.

All of the colleges that had received grants to support IPAS-related reforms were asked to answer questions about their technological, cultural, institutional, and project readiness that corresponded to the RTA framework (Karp & Fletcher, 2014). In order to ensure that our findings were not influenced by a particular set of preexisting conditions or cultures, we chose to study colleges that varied in terms of their RTA scores, institutional characteristics (sector type, urbanicity), and project goals for IPAS. Table 1 provides an overview of the six sites. All college names are pseudonyms.

Table 1
Case Study Sites and RTA Scoring

Site	Sector	Urbanicity	Project Goal	Readiness for Technology Adoption
Crescent Community College	Community college	Suburban	Improve information provision	Low (Logistical readiness; clarity of goals)[a]
Lakeside Community College	Community college	Suburban	Redesign advising	High
Harbor University	Open-access four-year (historically Black university)	Urban	Integrate technology and automate disconnected and paper-and-pencil processes	Low (Vision of benefits)
Forest Hill University	Open-access four-year	Midsize city	Integrate multiple technology platforms	High
Treetop Community College	Community college	Rural	Improve counseling efficiency and personalization	Low (Project management resources; communication)
Bluffview Community College	Community college	Small city	Integrate counseling and risk management	High

[a] See Karp and Fletcher (2014) for details on the areas of readiness in parentheses.

4.1 Data Sources

The data in this paper are from a larger study investigating changes in college practices and structures due to IPAS-mediated reforms.[4] Data are drawn from in-depth site visits that took place early in the implementation process (fall 2013) and follow-up telephone interviews that were conducted approximately six months later (spring 2014). Future analyses will examine the influence of IPAS reforms over a longer period of time. For the purposes of this paper, however, we are interested in how projects are led and how leadership approaches are related to early change processes, so we rely on data from the first year of IPAS reforms.

Over the course of three-day site visits to each college in fall 2013, we conducted semi-structured interviews with 52 administrators and key IPAS project personnel. In these interviews, we asked about their motivation for engaging in technology-mediated advising, their vision of benefits for the reform, their general approaches to leadership, and how decisions are made within their particular college climate. We also conducted semi-structured interviews with 49 IPAS end users, including advisors, faculty, and support staff. In addition to questions on the above topics, end users were asked more specifically about their plans for using IPAS, and they participated in a guided observation, during which they performed a structured advising task. Finally, we conducted 18 focus groups with 69 students in order to examine their experiences with advising and student services. In addition to exploring their use of services in connection with specific tasks, such as picking a major, mapping out a degree plan, and registering for courses, the focus groups explored students' preferences for in-person versus technological support.

During spring 2014, we conducted follow-up telephone interviews with a subset of the participants we interviewed during the fall (n = 12). These interviews focused on the ongoing implementation and adoption of IPAS, as well as early changes to advising and student services related to IPAS. They were only conducted with the one to three people at each college who were either most directly involved in implementing IPAS or most directly impacted by its implementation. Table 2 provides a summary of our data sources.

[4] More information about the study, as well as additional papers examining implementation processes and outcomes, can be found on CCRC's website at http://ccrc.tc.columbia.edu/research-project/integrated-planning-and-advising-services.html.

Table 2
Data Sources

Participant Type	Number of Participants	Interview Type	Focus of Interview
Fall 2013 site visits			
Administrators and key project personnel	52	In-person	Leadership's vision for IPAS reform and approach to implementing IPAS
End users	49	In-person	Leadership's vision for IPAS reform and approach to implementing IPAS, intentions to use IPAS, guided observation of advising task
Students	18 groups/ 69 students	In-person	Experiences with advising and student services, preferences for in-person versus technological support
Spring 2014 follow-up interviews			
Administrators and key project personnel	11	Phone	Progress with ongoing implementation and adoption of IPAS, changes in advising and student services related to IPAS
End users	1	Phone	Progress with ongoing implementation and adoption of IPAS, changes in advising and student services related to IPAS

4.2 Analysis

In-person interviews and focus groups were transcribed verbatim. Detailed notes were used for analysis of the telephone interviews. Transcripts and notes were coded and analyzed using Atlas.ti software. A preliminary code list was developed based on the interview and focus group protocols, and on our initial impressions of possible themes. Four rounds of test coding, in which two to four researchers coded the same documents, were conducted to refine the preliminary codebook and establish interrater reliability. The documents selected for test coding were chosen to represent a cross-section of sites and participant types. We continued to monitor interrater reliability through ongoing coding checks conducted by the lead researcher for every fifth transcript.

To verify who the institutional and project leaders were at each college, a code for "leadership" was applied to all quotations referencing institutional leaders, and a code for "IPAS implementation team" was applied to all quotations discussing IPAS project management. The leadership code was also used to capture general styles of leadership (e.g., authoritative or collaborative) and to identify organizational hierarchies.

To understand leaders' approaches to IPAS implementation, we used the following codes to assess whether they viewed IPAS as a technical or adaptive change: "IPAS rationale," "IPAS benefits for faculty," "IPAS benefits for advising services," "IPAS benefits for students," and "IPAS benefits for other personnel." The code for IPAS rationale revealed leaders' general opinions regarding the purpose of IPAS, while the benefit codes provided concrete information about leaders' goals for IPAS. Quotations suggesting that the rationale for implementing IPAS or the intended benefits from doing so involved adaptive changes in structures, processes, and attitudes were double-coded as "vision for transformative practice."

After the documents were coded, transcripts were assigned document families in Atlas.ti based on two main categories: participant type (administrator, key personnel, end user, and student) and site. Querying tools in Atlas.ti were then used to identify themes, first within and then across document families. Finally, the network tool in Atlas.ti and Excel spreadsheets were used to organize quotes and group them according to emerging themes.

Following the first round of coding and analysis, a second round of coding was conducted to categorize leadership approaches as either adaptive or technical. A rationale or benefit indicating a strong change orientation and a comprehensive vision of benefits linking IPAS to advising reforms (e.g., IPAS will help advisors provide students with more intensive, individualized assistance) was categorized as an adaptive leadership approach. A rationale or a benefit representing a limited vision of benefits focused on technological efficiency and requiring little change in current functioning (e.g., IPAS will improve the efficiency of online processes) was categorized as a technical leadership approach. Once individual leaders had been classified as having either a technical or an adaptive leadership approach, we classified each college within a leadership typology based on the combination of technical and adaptive leadership styles at the institutional and project levels.

After a baseline picture of leadership approaches had been established using the 2013 data, 2013 findings were compared to 2014 data to assess the consistency of colleges' leadership approaches over time. To evaluate whether leaders' understanding of the benefits from IPAS had changed or evolved, the findings from 2013 regarding their

vision of benefits were compared to interview participants' responses to the following questions in 2014: "How would you characterize the college's current vision for IPAS?" and "Have there been any changes in what the college leadership hopes to achieve with IPAS since our site visit in the fall?" As before, we then categorized individual leaders' vision of benefits as representative of either a technical or adaptive approach to change and then identified the style of leadership at each college, according to our typology.
In addition, we used the 2014 data to identify early signs of transformative change. We analyzed discussions of how key personnel and end users were engaging with IPAS systems to assess whether plans for use or actual use involved significant changes to advising practices and student support services at the structural, process, or attitudinal level. For example, we defined the decision to have students develop an education plan using an IPAS tool in student success courses as a structural change. Finally, leadership types at each college were compared to the signs of change at each college in order to determine whether there was a correlation between leadership style and change.
Throughout the analysis process, themes and findings were vetted during weekly team meetings and via email with team members who conducted the research.

5. Descriptive Findings

5.1 Four Types of Leadership

Using the analysis procedures described above for our 2013 data, we developed a typology of leadership styles based on how institutional- and project-level leaders fit into Heifetz's technical-versus-adaptive-change framework. The four patterns of leadership that emerged were: presidential, visionary, technologically focused, and divided. *Presidential* colleges had adaptive leadership at the institutional level, but technical leadership at the project level. *Visionary* colleges had adaptive leadership at the institutional and project levels. *Technologically focused* colleges had technical leadership at both levels. *Divided* colleges had technical leadership at the institutional level, but adaptive leadership at the project level. Table 3 outlines the four leadership types, which we describe in more detail below.

Table 3
Typology of Leadership Styles

Type	Institutional Level	Project Level
Presidential	Adaptive	Technical
Visionary	Adaptive	Adaptive
Technologically focused	Technical	Technical
Divided	Technical	Adaptive

Presidential. Colleges with a presidential leadership style had institutional-level leaders with a clear vision of change and rationale for engaging in IPAS-related reforms. However, this high-level vision was not immediately shared with or transmitted to project leaders and other members of the college community. As a result, project leaders and end users did not have a clear understanding of the reform; they often viewed it as a technical change and were not committed to the harder work of adaptive change and reforming their work processes.

In 2013, Lakeside Community College exemplified the presidential type. It had a nationally recognized president and visionary senior administrators who were already engaged in the process of reforming their advising system prior to undertaking IPAS. The biggest component of the reform involved switching from assigning advisors based on students' last names to assigning them based on program of study. This switch would allow advisors not only to become specialists in a limited number of programs but also to provide students a primary point of contact in the advising office for the duration of their time at the college. In preparation for IPAS, institutional leaders evaluated the college's technology landscape and considered the potential impact of IPAS implementation from the end user's perspective. In doing so, they developed a clear vision of how IPAS could be used to transform advising services by allowing more time for in-depth case management. For example, one upper level administrator described how important it was that the college started with a plan for redesigning its model of advising before looking into IPAS technologies.

> You know what makes our project really cool? … We were in a good place because we were in the process of a significant redesign in advising and counseling, and we

> were in a redesign sort of in our student entry process. So all of the discussions, the goals, were all mapped. So there is a whole flow diagram that has nothing to do with technology, and we could just layer the technology over it. So we're sitting with a redesigned model in student affairs and layering technology where it was missing, or where it was inadequate.

However, the primary mid-level project leader did not fully understand or buy into the reforms during early implementation planning in 2013. At that point, he was primarily focused on the technical logistics of implementation, and viewed the goal of the project as providing a tool that would allow advisors to manage their work "more effectively, more efficiently." This project leader did not see IPAS as a means of supporting the more intensive case-management approach to advising that the reforms were intended to create. Because he viewed IPAS implementation as a relatively straightforward technical task, he did not see a need to discuss implementation with end users.

Visionary. From the beginning of its IPAS project, Bluffview Community College exemplified the visionary approach to leadership. College leaders prioritized open communication and engaged stakeholders at all levels in a mission-framing exercise designed to align the missions of disparate departments. Because the IT department was included in the exercise before being tasked with leading IPAS implementation, project planning began with a clear focus on using IPAS as a tool for achieving shared goals. Consequently, IPAS was championed by both institutional and project leaders, who were united in a shared vision that resonated with end users across the college.

Institutional leaders set the vision, but they gave the authority for enacting the vision to like-minded project leaders. Both institutional leaders and projects leaders were invested in using IPAS to change the way students and advisors interact. For example, one of the primary project leaders explained how a vice president communicated from the beginning that undertaking IPAS meant making a major commitment to changing advising processes.

> One of the things he [a vice president] was pretty adamant about if we were going to apply for the grant was that we would actually follow through with it. If this is something we are going to do, we really need to do it. But he had to make sure everyone was committed to it, and not just make

> it one other way students could work with us, but *the* way they work with us. Commitment from ed services to basically [say], you are getting rid of all your paper forms. … So for AgileGrad [education planning system], we are redesigning it around the whole concept that advisors can be sitting down at a computer with a student.

Technologically focused. Crescent Community College had neither institutional nor project leaders with a clear vision for transformative change during the early phases of its IPAS implementation. The college was slow to get started with IPAS, and implementation plans were met with hesitation and resistance from end users, who did not see a need for IPAS.

At this college, institutional and project leaders alike concentrated on the mechanics of using IPAS to increase efficiency. For example, the biggest benefit one institutional leader described was shorter wait times to see an advisor. A key project leader was even more narrowly focused on the number of screens students and advisors would have to navigate to access important information.

> And again, with this student appointment scheduling system coupled with the student planning module, in my judgment, they [advisors] should be able to be more efficient. Better use of their time … We have to improve efficiency. Otherwise, we'll never achieve the level of customer service that we hope to accomplish through this project. … We can't force a user through five screens; let's get it down to one or two screens. Two clicks, maximum three clicks to get the information.

Divided. Finally, divided colleges had strong project-level leaders who valued the IPAS project and understood how technology could lead to transformative change. However, the lack of support from institutional leadership stymied their initial reform efforts. In 2013, institutional leaders at Harbor University had a greater interest in the prestige of receiving the IPAS grant than they did in using IPAS to transform practice. After assigning responsibility for IPAS to project leaders, they were relatively hands-off. One institutional leader stated:

> Honestly, I … I saw a proposal for a [name of the foundation] grant, for, you know, a decent amount of money, and if it were technology and advising, and I was

> like, we ought to do something with this. I … I really honestly can't say I had any great vision of what … what we should be doing. Just knew we needed to do something, and so I asked [project leader] to look at it and work on it.

At the time, project leaders were in the midst of reevaluating advising processes across the university to standardize inconsistent and haphazard processes for assigning advisors that left many students without a clear point of contact. As a result, the primary project leader was well positioned to consider how IPAS could support larger reform efforts. Because the college's IPAS project, an early alert system, depends to some extent on students having assigned advisors, she viewed its implementation as a productive way of structuring efforts to standardize advisor assignments.

> And so I think what Starfish [early alert software] is doing is, it's forcing the university's hand to really kind of clean up its process, clean up its data, and really visit how we do advising now, which I think is a great thing because it is necessary.

5.2 Changes in Leadership Types from 2013 to 2014

Table 4 outlines the leadership types found at each college in 2013. Few colleges had aligned approaches across institutional- and project-level leadership; at four of the six colleges, one level of leadership took an adaptive approach, while the other took a technical approach.

Table 4
Colleges' Leadership Types in 2013

College	2013 Leadership Type	Institutional Level	Project Level
Forest Hill University	Presidential	Adaptive	Technical
Lakeside Community College	Presidential	Adaptive	Technical
Bluffview Community College	Visionary	Adaptive	Adaptive
Crescent Community College	Technologically focused	Technical	Technical
Harbor University	Divided	Technical	Adaptive
Treetop Community College	Divided	Technical	Adaptive

After establishing our leadership typology based on 2013 data, we reassessed colleges' leadership types using the 2014 data. We found that our typology remained stable over time, in that we were able to identify the same four types of leadership among the colleges in our sample. However, three of the six colleges saw significant shifts in their leadership's orientation toward change. At Lakeside Community College, project leaders' approaches grew more aligned with institutional leaders' vision of adaptive change. At Forest Hill University, which like Lakeside had a presidential approach to change in 2013, institutional leaders lost their adaptive approach to some degree and became more aligned with project leaders' technical approach to change. In contrast, at Harbor University, institutional leaders made a dramatic shift from a limited vision of change toward a vision of adaptive change aligned with project leaders' vision.

At Bluffview Community College, the only college that started with a visionary leadership style, both leadership levels maintained their shared vision for IPAS. Leaders at Crescent Community College and Treetop Community College also maintained their original orientation toward change. At Crescent, both levels of leadership continued to have the same limited view of change, while at Treetop, project leaders maintained their vision for adaptive change despite a continued lack of support and limited view of change among institutional leaders. Table 5 presents a comparison of colleges' leadership types in 2013 and 2014.

Table 5
Colleges' Leadership Types in 2013 and 2014

College	2013 Leadership Type	2014 Leadership Type
Forest Hill University	Presidential	Technologically focused
Lakeside Community College	Presidential	Visionary
Bluffview Community College	Visionary	Visionary
Crescent Community College	Technologically focused	Technologically focused
Harbor University	Divided	Visionary
Treetop Community College	Divided	Divided

5.3 Early Signs of Transformative Change

By the time of our interviews in 2014, colleges were far enough along with IPAS implementation that clear indications of changes in structures, processes, and attitudes could be observed. Three out of the six colleges—Bluffview Community College, Lakeside Community College, and Harbor University—demonstrated early signs of transformative change. Bluffview was implementing an education planning tool, while Lakeside and Harbor were rolling out early alert systems.

Bluffview Community College has a unique system of advising. The college does not have faculty advisors, relying instead on a small number of professional advisors and special program advisors (e.g., for international students and veterans) and a large number of part-time advisors employed during peak registration periods. Students who are not part of a special program do not have assigned advisors and usually drop in to meet with any available advisor rather than scheduling an appointment. In the past, part-time advisors mainly assisted students with registration and did so using paper forms. Before the introduction of IPAS, the main tool for long-term program planning was a paper worksheet. One member of the student services staff explained that students did come to advising for help with planning, but the planning process was largely left to students' own initiative.

> I think the majority of people don't come until they have been here a couple of quarters. Then maybe they heard they should start doing some planning. If you don't schedule some things just right, you could be here an extra quarter or two. … I'm not sure how they are hearing about that, maybe friends or other people.

To leverage its IPAS planning tool, Bluffview restructured its advising staff and procedures. Given the limitations imposed by such a small advising staff, implementation team leaders employed diverse strategies for embedding the IPAS education-planning tool into institutional functioning. They decided to require students in student success courses to develop an education plan. They also upgraded the college's advising room to include dual-monitor computers in order to involve part-time advisors more closely in education planning using IPAS, and to encourage them to transition away from paper-and-pencil program planning processes.

In addition, project leaders provided extensive training for end users and frequently reiterated their vision for using the tool to promote long-term education planning and keep students on track for completion. As one institutional leader put it, advisors "would have to be under a rock" not to know about IPAS. Consequently, as soon as the education planning tool was launched campus-wide, advisors changed the way they interacted with students. It quickly became standard practice for advisors to ask all students if they had a plan, and if not, to create one with them or explain how to create one.

As discussed previously, at the time of its IPAS implementation, Lakeside Community College was in the midst of transitioning from assigning students to advisors based on their last names to assigning them based on their program of study. Under the old model, advisors reported that they primarily met with students during drop-in hours. Because advisors were essentially generalists covering all programs of study, it was typical for students to meet with the first available advisor, rather than waiting to schedule an appointment with their assigned advisor. Lakeside had an electronic system for midterm progress reporting, but the system did not provide a means of systematic follow-through to connect students who were struggling to support services.

To facilitate the development of a more robust case-management model of advising, institutional leaders envisioned using an early alert system to provide more individualized and intensive student support. When they recognized that the primary project leader did not share that vision for IPAS, they launched a concerted effort to communicate a broader vision of change across campus. The first IPAS function Lakeside implemented institution-wide was a midterm progress reporting function within the early alert system. Institutional leaders were invested in helping project leaders and end users understand IPAS as more than just a new technology for completing a standard reporting requirement. They repeatedly emphasized that the early alert system was a tool designed to support the larger advising reforms moving toward a case-management model of advising. They encouraged faculty to take advantage of the IPAS system's ability to provide more in-depth information on students' progress, and they encouraged advisors to follow up on that information. The first semester that IPAS was used for midterm progress reporting, more faculty submitted progress reports, advisors followed up with both students and faculty, and more students went back and talked to their

advisors and professors. As a result, the primary project leader developed a better understanding of the vision for change, and his views started becoming more aligned with those of institutional leaders.

At Harbor University, each academic department used its own model for assigning students to advisors prior to the implementation of IPAS. Consequently, the quality of advising varied widely; some students received extensive support, while others did not even know they had an advisor. Recognizing how detrimental these inconsistencies were to student success, the project leaders at Harbor University started with a vision for transformative change to advising processes. At the time of the interviews, they were in the midst of reviewing different models of advising used by various departments to identify best practices and create a standard, campus-wide model. Ideally, they hoped to develop a more "intrusive" and "engaging" approach to advising that would start with summer orientation, continue with mandated advising for registration each semester, and contain multiple checkpoints (faculty advisors, department chairs, student success staff). Thus, project leaders were already moving toward a more holistic approach to advising before undertaking IPAS. However, the process of implementing IPAS "catapulted" them into an even higher level of adaptive thinking. Project leaders had anticipated that implementing an early alert system would generate 2,000 or fewer flags, in which case there would have been no need to change routine processes for reaching out to students struggling academically. Within the first few months, however, the IPAS team received over 17,000 flags for over 4,000 students. Staff simply did not have the capacity to respond to so many alerts using standard operating procedures.

However, the project leader at Harbor recognized that the wealth of data being generated through the early alert system created an opportunity to identify and support at-risk students in entirely new ways. Within a short time period, she developed a triage system based on the number and type of alerts a student received, enabling staff to identify the students most at risk and to provide increasingly intensive levels of support. This triage process complemented structural changes being made to the assignment of advisors. Together, the changes in structures and processes established a strong foundation for more holistic advising.

At the other three colleges, advising structures, processes, and attitudes largely remained the same from 2013 to 2014. Forest Hill University continued using its existing homegrown early alert system, institutional leaders at Treetop Community College failed to support IPAS by mandating or otherwise encouraging faculty advisors to use the IPAS education planning tool, and institutional and project leaders at Crescent Community College maintained their view of IPAS as a means of providing students access to information more efficiently. Table 6 summarizes the early signs of transformative change observed at Bluffview Community College, Harbor University, and Lakeside Community College.

Table 6
Examples of Early Signs of Transformative Change Through IPAS Implementation

	Education Planning (Bluffview)	Risk Targeting and Intervention (Harbor and Lakeside)
Structural	Creation of an education plan is introduced as a course requirement.	An early alert system is linked to a redesigned structure for assigning advisors.
Process	The focus of advising shifts from short-term course selection to holistic education and career planning.	The early alert system strengthens feedback loops, and prompts a new emphasis on triage services.
Attitudinal	IPAS is seen as an advising reform rather than as a means to increase efficiency.	IPAS is seen as an advising reform rather than as a means to increase efficiency.

6. Analysis

We found a clear correlation between colleges' leadership types and the presence of early signs of transformative change. Of our six sites, only Bluffview Community College, Harbor University, and Lakeside Community College—where institutional and project leaders shared a clear vision for adaptive change in 2014—began to see changes in structures, processes, and attitudes. Leaders at those colleges viewed IPAS as a complex reform, not just a new technology. They focused on understanding how technology could be used to support institutional goals for improving student success, and on conveying how using IPAS in that way would change end users' day-to-day jobs. We did not see signs of transformative change at the other three sites, where institutional and project leaders did not both demonstrate an adaptive leadership style. Treetop

Community College maintained its divided leadership style in 2014, and project leaders failed to make significant changes without the support of institutional leaders. At Crescent Community College and Forest Hill University, institutional and project leaders were technologically focused in 2014 and failed to make any significant changes via the introduction of IPAS. These patterns are summarized in Table 7.

Table 7
Summary of Findings

College	2013 Leadership Type	2014 Leadership Type	Early Change
Bluffview Community College	Visionary	Visionary	Yes
Forest Hill University	Presidential	Technologically focused	No
Lakeside Community College	Presidential	Visionary	Yes
Harbor University	Divided	Visionary	Yes
Treetop Community College	Divided	Divided	No
Crescent Community College	Technologically focused	Technologically focused	No

Examining the experiences of the three colleges in which institutional and project leaders demonstrated an adaptive approach to change provides further insight into why the alignment of the two leadership levels matters. Each of the three colleges had slightly different methods for building consensus between leaders, but regardless of how they achieved consensus, it was ultimately their shared vision for adaptive change that appeared to make a difference.

Interestingly, only one of the colleges with a visionary leadership style in 2014, Bluffview, had institutional and project leaders who started with a shared vision for IPAS in 2013 and remained committed to that vision in 2014. Lakeside and Harbor only developed a common vision after technologically focused leaders gained insights into the goals for IPAS from adaptive leaders. The 2014 data pertaining to stakeholder engagement with IPAS revealed that implementation served as a learning process for these leaders. By 2014, the primary project leader at Lakeside and the institutional leaders at Harbor had developed a more adaptive vision of change.

Bluffview Community College provides the clearest example of how aligned, adaptive leadership supports transformative change. Because the college's leaders were working together to use IPAS to achieve institutional goals for student success, they were able to communicate their vision in a way that resonated with the broader college community. It was important that this vision was communicated by two different leadership levels, and that both levels of leadership were highly respected by end users for their hard work and their dedication to students. The college community therefore saw that IPAS-related reforms were important, connected to the institutional mission, and worth undertaking.

For example, a key project staff member described how meaningful it was that a vice president was promoting IPAS as a student success strategy: "I'm excited to see that [IPAS] couched in a bigger student success initiative. … It's not just an initiative; it is something that we need to embrace. Something that our VP has been pushing for a long time."

At the same time, an end user appreciated that one of the key project leaders was deeply involved in the daily work of advising, understood the impact of IPAS on end users, and was in a position to communicate the needs of end users back to upper administration.

> In some ways, it has to be the people that are working daily because they're the only ones that are going to be able to understand what that's going to look like. … So it can't necessarily be the executive leadership to be able to make those decisions. … I believe in [IPAS project leader] wholeheartedly that he can kind of be that intermediary. … He can explain to people what the implications are, and it has to be kind of at that level, where it's somebody that works on the ground that has the connection with the people that are going to see it, and also has the technical ability and the ability to communicate it to the administration, so that they can see what that means for resources.

Moreover, early alignment enabled leaders at Bluffview to confront and solve challenges that arose during the implementation process. Bluffview leaders quickly learned that the technical aspects of IPAS implementation were harder and more time-consuming than they had imagined. However, because institutional and project leaders

understood IPAS as a vital resource for driving changes that would further Bluffview's mission and promote student success, both levels of leadership were committed to integrating IPAS into the college's structures and business processes, and to encouraging reform among end users. Thus, institutional leaders readily supported the staffing changes necessary to allow project leaders to allocate more time to IPAS.

At Lakeside Community College, the reforms originated from upper administration, but institutional leaders involved in IPAS were committed to ensuring that the institution's reform-oriented goals for student success were shared by all stakeholders. Therefore, when it grew apparent that a key project leader did not understand institutional leaders' vision for IPAS as a vehicle for adaptive change, it became important for those upper level institutional leaders to intervene. Not only did the project leader view IPAS simply as an efficiency tool, but he also approached implementation as a technical task and did not allow for any input from end users. One end user expressed a great deal of frustration with this leadership approach:

> We never have any meetings. They don't like to open it up to somebody having a question. … It used to be, you know, we used to have a lot of meetings. … We have a new supervisor. It's his way, and that's the only way.

To create a more unified approach to implementation, institutional leaders held a series of meetings with the project leader and advisors to ensure that the broader purpose of IPAS, not just a description of the technology tools, was being communicated to all relevant stakeholders. Once institutional leaders intervened to reinforce the adaptive vision for change that IPAS was a part of, the project leader gained greater awareness of the connection between IPAS and larger advising reforms, and advisors became more receptive to using IPAS tools.

In contrast to the collaborative approaches at Bluffview and Lakeside, a strong bureaucratic culture at Harbor University created a top-down approach to decision making. Because the organizational hierarchy was so clear-cut, it provided well-known and consistent levers for change. Thus, when project leaders had a vision for IPAS as a vehicle for transformative change that was not initially shared by institutional leaders, they knew which institutional leaders they needed to gain support from, and they knew

how to access them. The primary project leader was acutely aware of the need for support from upper level administrators, commenting:

> We are not a grassroots-up, bottom-driven type of culture. We need to know that this is something that is being supported by someone who … in my chain of command is on board, and they are going to be held accountable. There are going to be rewards and consequences either way from me quote "buying in" and participating.

To gain upper level administrators' support for IPAS, the primary project leader understood that she would first have to demonstrate some early successes. Consequently, she led multiple trainings and actively promoted use of the IPAS early alert system—efforts that directly contributed to the large number of alerts submitted within the first few months of launching the tool. Impressed by the campus-wide engagement with IPAS and by project leaders' initiative in using IPAS to support advising reforms, institutional leaders at Harbor became more invested in actively supporting and encouraging the use of IPAS. As a result of the project leaders' efforts, the provost issued something "between a soft and a hard mandate," sending out a letter asking faculty to use IPAS. Afterwards, the adoption of IPAS grew even more widespread. Thus, institutional leaders ended up acting in concert with project leaders in order to position the university for transformative change.

Forest Hill University provides an interesting counterpoint to the colleges aligned around an adaptive approach to IPAS implementation, in that leaders grew more aligned, but around a more limited technical approach. The departure of a strong institutional leader early in the implementation process created a leadership vacuum that only increased over time. Although the institutional leaders who took over the IPAS project understood the original leader's vision, they were unable to actualize or maintain it. Thus, the vision never fully reached project leaders or end users. By the time of the follow-up interviews, the vision of using IPAS as a tool to integrate information and connect people had largely been lost, making the need for IPAS less clear. Stakeholders at all levels were primarily focused on the technological functions of IPAS, such as the ability to schedule tutoring appointments online. Because Forest Hill was already rich in technological

resources, though, those functions failed to provide much added value, and they did not alter existing advising structures or processes.

Overall, evidence from our six case studies makes a compelling case for the importance of a visionary approach to leading technology-mediated reform. As Bluffview, Lakeside, and Harbor all demonstrate, for IPAS to generate significant changes in structures, processes, and attitudes, leaders must share a vision of IPAS as an advising reform, not just a technological tool. Crescent and Forest Hill, which were technologically focused, did not see transformative changes. Importantly, the vision of IPAS as an advising reform must be shared by institutional and project leaders; as Treetop demonstrates, adaptive leadership in one group alone is not sufficient. Because reforms touch multiple levels of institutional functioning, multitiered leadership with aligned goals is necessary to carry out a vision for adaptive change.

7. Conclusion

Although longer term data will be necessary to determine whether technology-mediated advising improves student outcomes in broad-access colleges, our findings suggest it may be capable of doing so. Our findings also shed light on the type of leadership needed for transformative change. In line with Karp and Fletcher's (2014) RTA framework, we find that readiness for technology adoption requires leaders from at least two levels of the institution—upper level institutional leaders and mid-level project leaders. Based on this finding, we would expect to see transformative changes at only three of the six colleges we studied, and we hypothesize that a primary reason for the lack of change at the other three colleges is a lack of adaptive leadership for IPAS *at multiple levels*. Having adaptive leaders at a single level—either at the institutional level or the project level—is insufficient for encouraging widespread adaptive change. Rather, a reform is most likely to be transformative when institutional and project leaders have aligned approaches and work in tandem.

Our findings on the importance of multitiered leadership support previous literature on leadership and change management—particularly Kotter's (1990, 1996) work, which focuses on the benefits of leadership teams that include both strong

managers and strong leaders, and Kezar's (2014), which emphasizes the importance of shared leadership between upper level administrators and grassroots leaders. Exploring the relationships between different levels of leadership is crucial, particularly because mid-level leaders are placed in the challenging position of having to navigate communication and relationships with colleagues in positions above and below their own.

Top-level administrators control financial resources for IPAS technologies, shape the institutional culture to encourage receptiveness to IPAS, and have the authority to mandate IPAS use when necessary. Their support lends legitimacy to projects by representing institutional backing. However, mid-level project leaders are the ones who ultimately drive change on the ground. They are responsible for translating the vision for IPAS into action, changing existing systems and processes to integrate IPAS, and promoting end user adoption—activities that are directly related to the project's success or failure. The support of mid-level leaders gives a project greater credibility because they are often end users themselves, or directly responsible for supervising end users. On the other hand, if project leaders do not share institutional leaders' vision, they can essentially become bottlenecks, preventing institutional leaders' vision from reaching end users. Furthermore, in the context of IPAS, mid-level project leaders frequently carry out the dual role of managing technology and managing the people who use it. The complexity of mid-level leaders' position suggests that support for mid-level leaders is a crucial component of achieving transformative change through technology adoption.

However, alignment between institutional- and project-level leaders is insufficient to drive transformative change, if leaders are aligned around a limited vision of change. Institutional and project leaders must have a clear, actionable vision for change at the structural, process, and attitudinal levels. Without this, there is little chance of transformative change occurring, even if leaders are working toward a common goal. This finding supports Heifetz's theory about the type of leadership required for adaptive change, while simultaneously providing a more nuanced understanding of technical and adaptive change by applying the framework to the particular context of technology-based reform. In the case of IPAS, the institutional and project leaders who were aligned around a limited vision of change appeared to default to a focus on technical functionalities and implementation tasks.

Further expanding Heifetz's theory, our study provides insight into how technical and adaptive orientations can evolve over time based on the experience of engaging in change. Both Lakeside Community College and Harbor University encountered unanticipated challenges that caused them to rethink their entire approach to implementation. Institutional leaders at Lakeside increased efforts to communicate their vision to project leaders, and project leaders at Harbor developed a new system for managing early alerts, gaining support from institutional leaders in the process. Given that adaptive change is complex and contextual by definition, it is important to highlight that there does not appear to be formula for leadership or approaching change. Aligned, visionary leadership took different forms at each of the three colleges demonstrating early signs of transformative change, and was successful because of its sensitivity to unique institutional contexts.

Although our findings are in line with much of the supporting literature on leadership and change management, it is important to note these are preliminary findings that do not include the final round of data collection for this study. In order to determine if the early signs of structural, process, and attitudinal change create lasting transformative change, it will be essential to examine trends in leadership and technology use over a longer period of time. We would also expect the ability to maintain adequate funding levels to support IPAS technologies to become a more salient issue over time (particularly for colleges such as our case study sites that purchased technology with one-time grant funds), and would recommend that future studies explore the relationship between institutional and project leaders in controlling and allocating financial resources over a longer period. Finally, it is important to emphasize that these findings are based on the experiences of only six institutions, and thus provide useful information about general trends and potential implications rather than firm conclusions.

How to ensure that large-scale reforms in higher education are effective remains an open question. However, this study contributes to a theoretical understanding of leadership and organizational change by accounting for the complexity of leadership within broad-access colleges. It also provides insight into the unique opportunity to promote transformative change afforded by recent advancements in technology-mediated advising.

Based on our findings, we would recommend that colleges that are considering engaging in technology-meditated reform: (1) assemble implementation teams that include both strong institutional leaders and strong mid-level project leaders; (2) provide adequate support for mid-level leaders so that they have both the authority to be seen as credible by end users and the legitimacy to convey end users' needs to institutional leaders; (3) focus on an adaptive, reform-oriented vision for change occurring at multiple levels (structural, process, and attitudinal) that connects technological tools to larger advising reforms; (4) be willing to engage in implementation as a learning process and change course if necessary; and (5) consider how a specific institutional context influences the types of leadership approaches likely to be effective.

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