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A Complex Ecosystem: A Qualitative Investigation Into Dynamics Affecting the Implementation of College Advising Redesigns

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Abstract

Academic advising plays a critical role in student engagement and persistence at community colleges, and colleges are increasingly adopting advising technologies to increase their capacity to support students. However, much remains unknown about the process of planning for and implementing technology-mediated advising redesigns. To explore these reforms' complex dynamics, we adapted Urie Bronfenbrenner's ecological systems theory of human development, conceiving of the student advising experience as embedded in three interrelated contexts: the external environment (the political, economic, and cultural environment outside the institution), the institutional environment (where changes in practice are implemented), and the interpersonal environment (where advising interactions occur). Using interview data collected from a diverse group of stakeholders at two community colleges and two broad-access four-year institutions, we identified several dynamics that have implications for practitioners, funders, and policymakers looking to enact technology-mediated advising reforms. External dynamics included involvement in national college completion organizations and initiatives, state policies related to college completion, and state and local economic conditions. Institutional dynamics included resource constraints, the degree to which advising policies and procedures were centralized, and approaches to managing institutional change. Finally, interpersonal dynamics included individual advising approaches, advising capacity, and reactions to technology.

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CCRC's Role in Three iPASS Research Projects

The Integrated Planning and Advising for Student Success (iPASS) initiative—which has provided up to $225,000 to each of 26 colleges to help them adopt technologies for improving education planning, advising, and student risk targeting and intervention by 2018—was launched in 2015 with funding from the Bill & Melinda Gates Foundation and The Helmsley Charitable Trust. It followed on the heels of a similar initiative, undertaken from 2012 to 2015 at 19 colleges, in which several lessons were learned:

- Emerging technologies have the potential to allow students to create and follow academic plans effectively, receiving support when they struggle.
- Technology alone is not enough to achieve project goals. Deep changes in institutional structures, systems, and attitudes are required.
- High-quality advising and student support may be facilitated through a set of core SSIPP principles, which call for advising to be sustained, strategic, integrated, proactive, and personalized.

CCRC has been involved in both initiatives. Under the more recent initiative, EDUCAUSE and Achieving the Dream (ATD) have provided implementation services in the form of technical assistance to iPASS grantee colleges, while CCRC has conducted research on college activities and the student experience. All three organizations—EDUCAUSE, ATD, and CCRC—have sought to learn whether the reform of advising and student supports—made possible through the use of technology—provides students with a more seamless and holistic advising experience and ultimately improves student outcomes.

As an evaluator and thought partner in the 2015–2018 iPASS initiative, CCRC has been engaged in three related research projects, which have resulted in reports, presentations, blogs, tools, and other resources for the field.

Project 1. Measuring trends in development and scaling: CCRC has analyzed progress in implementation and student outcomes during the grant period across all 26 participating colleges. Resulting reports include a survey of technology use and advising practices provided to the colleges, a baseline report of key performance indicators (KPIs) (Armijo & Velasco, 2018), and a final report of trends in the KPIs after two years of project implementation (Velasco, Hughes, & Barnett, 2020).

Project 2. Understanding implementation: CCRC has studied implementation processes at nine colleges, some of which emphasized advising in STEM pathways. We conducted a review of the literature (Fletcher, Grant, Ramos, & Karp, 2016), reported on the use of predictive analytics (Klempin, Grant, & Ramos, 2018), released a set of case studies of four iPASS colleges (Klempin, Pellegrino, Lopez, Barnett, & Lawton, 2019), and studied how iPASS reform has unfolded at different levels of the college ecosystem (current paper). We also wrote an invited chapter on the SSIPP principles in practice (Klempin, Kalamkarian, Pellegrino, & Barnett, 2019).

Project 3. Evaluating enhanced advising at three colleges: In collaboration with MDRC, CCRC has conducted research at three colleges that were provided technical assistance as they developed enhanced iPASS advising systems targeted to specific student populations. We partnered in an evaluation that included a randomized controlled trial and qualitative fieldwork to understand implementation at each college. This resulted in a report on the project designs developed at each college (Kalamkarian, Boynton, & Lopez, 2018), an interim report on early outcomes (Mayer et al., 2019), a report on implementation (underway), and a final report on outcomes (planned).

1. Introduction

Despite the growing prevalence of advising and student services reforms at colleges across the country, much is still unknown about how they unfold. Research in this area has not fully described the internal and external circumstances that influence reform work or how stakeholders—including administrators, advisors, faculty, and students—perceive and are affected by those circumstances. To help address these gaps in the literature, researchers at the Community College Research Center (CCRC) conducted a qualitative inquiry at nine institutions implementing technology-mediated advising reforms with the support of iPASS (Integrated Planning and Advising for Student Success) grants from the Bill & Melinda Gates Foundation and the Leona M. and Harry B. Helmsley Charitable Trust. The current paper explores the reform process at four of those institutions and seeks to answer two main research questions:

1. What are the primary dynamics in and around an institution that influence how advisors and students experience advising redesign efforts?
2. How does the combination of these internal and external dynamics create opportunities and challenges for colleges?

In our analysis, we adapted Urie Bronfenbrenner's (1979) ecological systems theory of human development to understand the dynamics that influence institutional and individual responses to change in a complex environment. Conceiving of the student as the center of an interactive, nested series of systems, we explored the dynamics within and interplay between these systems and gained insight into the contextual factors that make redesigning advising a multifaceted, iterative, and long-term project.

Below, we provide a brief overview of the research on technology-mediated advising reforms and discuss why ecological systems theory is a useful lens for examining this work. We then describe how we approached our qualitative fieldwork and analysis. We present our findings in order of "distance" from the student. First, we describe how the environment external to the institution—furthest in distance from the student and not directly observable in students' experiences of advising per se—influenced the context in which colleges' advising redesign efforts took place. We then discuss how the interaction between external dynamics and institutional contexts affected

how individuals approached advising reform and ultimately how students experienced advising and support. Finally, we offer guiding questions for higher education practitioners, funders, and technical assistance providers to consider when planning the next phase of student support work to understand its complex dynamics.

1.1 Advising Reforms and the Growth of Advising Technologies

For decades, scholars and practitioners have agreed that academic advising is essential to college success, as it helps students set academic and career goals, develop academic plans, and connect to services that may help them stay on track to graduate (Center for Community College Student Engagement, 2018). Further, research on the influence of students' early college experiences on their long-term persistence suggests that advisors, who are often among the first individuals with whom a student interacts at an institution, play a critical role in promoting student engagement at the college (Davidson & Wilson, 2017; Pascarella, Terenzini, & Wolfle, 1986; Sandoval-Lucero, Antony, & Hepworth, 2017). The field, however, is still looking for strong evidence on effective, scalable strategies to improve advising and student outcomes.

A growing body of evidence indicates that advising interventions, as part of a suite of financial, academic, and nonacademic supports, can contribute to improvements in student outcomes. Interest in advising has been fueled by the positive outcomes of programs such as the Accelerated Study in Associate Programs (ASAP) at the City University of New York (CUNY), in which advisors have small caseloads and frequently meet with students face-to-face (Gupta, 2017; Scrivener et al., 2015; Sommo, Cullinan, & Manno, 2018), and One Million Degrees, a scholarship program based in Chicago that provides highly personalized support to students who qualify (Bertrand, Hallberg, Hofmeister, Morgan, & Shirey, 2019). Dramatic increases in degree completion at a few exemplar institutions, such as Georgia State University (Dimeo, 2017; Treaster, 2017) have also contributed to the conversation about the importance of advising. At Georgia State in particular, hiring more advisors and using student data to provide more targeted advising was a core component of the college's reform work.

Though a great deal can be learned by studying these programs and institutions, the multifaceted, comprehensive support they offer requires significant time and resources to scale institution-wide (Cormier, Sanders, Raufman, & Strumbos, 2019;

Renick, 2016). To provide more holistic student support in a timely and cost-effective manner, many colleges are relying heavily on technology. Over the past several years, the number of advising-related tools in the education technology industry has grown exponentially, creating a culture in which technology is viewed as the primary means of scaling support in resource-strapped institutions. A national survey conducted in 2019 showed that over 200 companies currently provide higher education technologies, with advising-related tools accounting for close to 65% of the market (Bryant, Seaman, Java, & Chiaro, 2019).

Technology systems related to core advising functions—such as education planning, risk identification (e.g., early alerts, predictive analytics), communication, and case management—have the potential to enhance student support by providing advisors and other staff access to more information about students and making it easier to monitor students' academic progress, identify students at risk of falling off track, and engage in targeted interventions with those students. Ideally, institutions should also leverage such technologies to adopt advising structures and processes that further enhance student support (Karp, Kalamkarian, Klempin, & Fletcher, 2016; Klempin, Kalamkarian, et al., 2019). For example, early-alert systems that allow faculty members to notify advisors about concerns with students are likely to be most effective if students have assigned advisors who can address those alerts (Klempin, Kalamkarian, et al., 2019).

While previous CCRC reports have examined discrete aspects of technology-mediated advising, such as institutional readiness for technology adoption (Karp & Fletcher, 2014), change management and leadership strategies (Karp et al., 2016; Klempin & Karp, 2018), and student opinions about advising and technology (Kalamkarian & Karp, 2015), much remains unknown about the complex dynamics that affect how technology-mediated advising is implemented and experienced by relevant stakeholders. Furthermore, though colleges have made substantial progress implementing technology-based advising, researchers have yet to find evidence that these changes to advising are improving short-term student outcomes (Alamuddin, Rossman, & Kurzweil, 2019; Mayer et al., 2019; Velasco, Hughes, & Barnett, 2020), suggesting a need for continued exploration of the broader institutional and societal landscapes that affect these efforts.

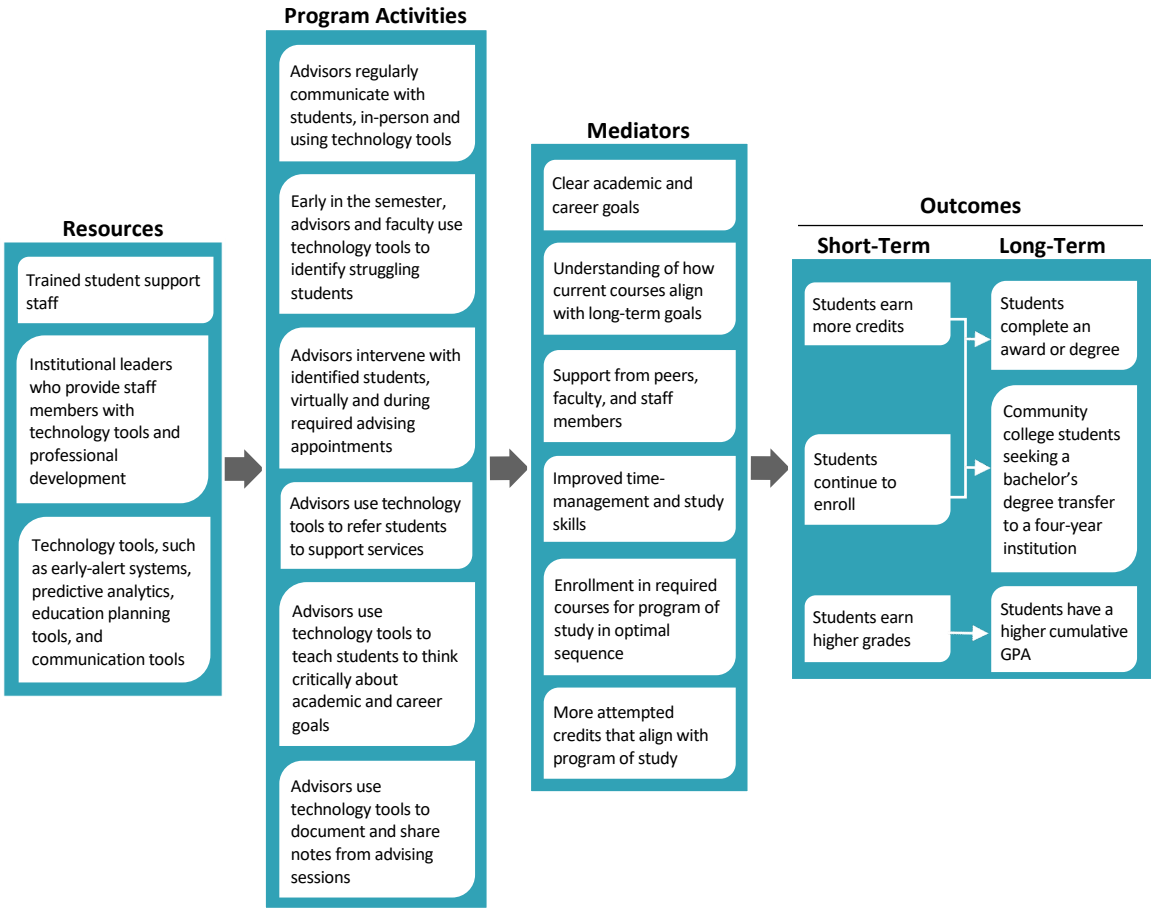
1.2 Evidence on Technology-Mediated Advising

Researchers at CCRC have developed a wealth of knowledge about technology-mediated advising by studying how it was implemented by two cohorts of iPASS grantee institutions from 2012 to 2018. Research on iPASS has included extensive literature reviews, 31 site visits to 11 community colleges and six four-year universities, an analysis of key performance indicators using five years of data from 13 community colleges and 13 broad-access four-year universities, and a randomized controlled trial at one community college and two broad-access four-year universities conducted in collaboration with MDRC. As a whole, this research demonstrates that colleges are approaching technology-mediated advising work thoughtfully and treating it as an opportunity to implement widespread institutional changes to improve student success (Karp et al., 2016; Velasco et al., 2020), including:

- moving from drop-in, generalist advising (where students in all programs see any available advisor) to a more personalized system of assigned, case-management advising (where advisors work with particular students in a limited number of programs throughout their time at college);
- increasing faculty involvement in orientation and advising;
- ensuring students are supported to create full-program academic plans (from entry through graduation or transfer);
- connecting education planning to career planning;
- using data from predictive analytics and early alerts to intervene sooner with students who may be struggling; and
- sharing case notes to improve communication between advisors and faculty members.

According to the iPASS logic model (Mayer et al., 2019), shown in Figure 1, such changes should lead to increased retention and credit accumulation and, ultimately, increased credential completion and transfer to four-year colleges by clarifying students' goals, ensuring students are taking the courses they need to graduate, and connecting students to a variety of supports. The logic model reflects the primary theory of change for this work.

Figure 1
iPASS Logic Model



Note. Figure adapted from Mayer et al. (2019).

However, neither a descriptive analysis of early key performance indicators (Velasco et al., 2020) nor an experimental analysis of iPASS interventions at three institutions (Mayer et al., 2019) found clear evidence of improvements across a range of student outcomes, including credits earned, grade point average (GPA), persistence from the first to the second year, and credential completion. Similarly, another randomized controlled trial of technology-enhanced advising interventions at 11 universities found no significant impacts after five semesters across the full sample (Alamuddin et al., 2019). Rather than leading to the conclusion that technology-mediated advising redesign efforts are ineffective, however, these findings may indicate that the underlying theory of change for iPASS has not sufficiently captured the full range of factors that affect implementation and student outcomes.

2. Using Ecological Systems Theory to Understand Organizational Change

Though early outcome metrics signal that iPASS grantees' advising redesigns have not had a marked impact on student outcomes, a more nuanced picture of the reform process emerged as CCRC researchers engaged with iPASS institutions on the ground. Qualitative fieldwork revealed that implementing advising reforms is highly challenging. This work can take years, is nonlinear, and requires significant structural and cultural changes. Further, these changes occur within complex institutions that vary along numerous dimensions, including sector (two-year versus four-year), size, location, and student demographics.

To explore how advising redesign efforts unfold, we adapted Bronfenbrenner's (1979, 2005) ecological systems theory of human development to examine the dynamics in and around an institution that influence the implementation of advising reforms. Our adaptation of Bronfenbrenner's theory considers the following settings (or "systems") that influence a student's experience:

- the external environment, or the broad political, economic, and cultural environment outside the institution;
- the institutional environment, where institution-level decisions are made and changes in practice are implemented; and
- the interpersonal environment, or the environment in which the student interacts regularly.

Considering how advising reforms take place across these interconnected systems allows us to take a holistic view of reform processes and illuminates challenges and opportunities for moving these reforms forward.

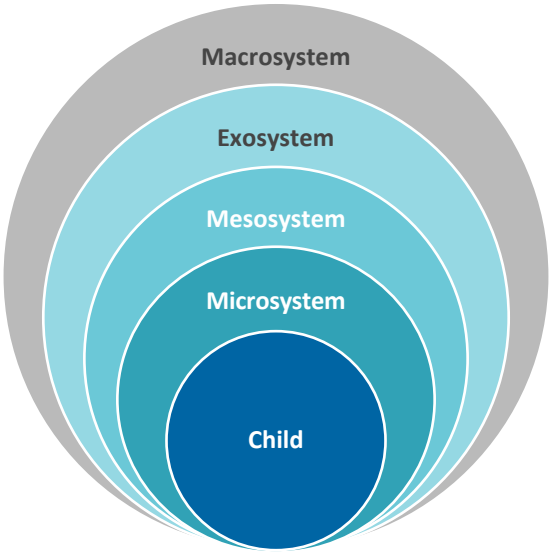
2.1 Ecological Systems Theory

Bronfenbrenner (1979) developed ecological systems theory based on the premise that human development cannot be considered independent of context. Existing theories of human development, he contended, neglected to account for the dynamic relationship between children and their proximal settings (parents, teachers), which are interrelated and situated within a broader context (parental employment, societal conditions, economic conditions). Bronfenbrenner conceived of this ecological environment as "a set of nested

structures, each inside the next, like a set of Russian dolls" (1979, p. 3) and of human development as a "progressive, mutual accommodation" (p. 21) between the individual and the dynamic settings surrounding them. Conceiving of the ecological environment in this way enables the researcher to examine the relationships between the individual and multiple surrounding settings (Bronfenbrenner, 2005, p. 107; McLinden, 2017).

Ecological systems theory describes a hierarchy of settings or systems that surround an individual and contribute directly or indirectly to the individual's development. The *microsystem* is a person's immediate setting, in which the individual has personal interactions and direct involvement. The *mesosystem* consists of a set of interconnected microsystems and serves as the linkage between the microsystem and two distal settings: the *exosystem*, where activities and events occur that influence the microsystem but do not directly involve the individual's participation, and the *macrosystem*, which consists of the broader social, political, and economic conditions within which the individual resides (Bronfenbrenner, 1979). These systems are illustrated in Figure 2.[1]

Figure 2
Bronfenbrenner's (1979) Ecological Systems Theory Model

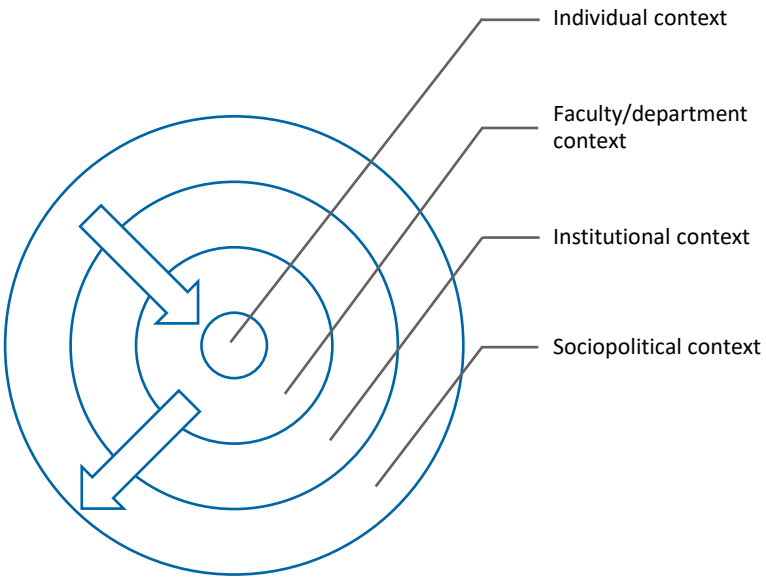


[1] To account for the ongoing changes that occur within individuals and their environments, Bronfenbrenner (2005) later introduced the concept of the chronosystem as a means to acknowledge (and possibly account for) the aspect of time and unplanned events in relation to human development.

2.2 Applications in Education Research

Contemporary scholars, particularly those with an interest in equity in education, have adapted Bronfenbrenner's ecological systems theory to educational settings in an effort to more precisely understand the systems that surround learners and identify barriers and facilitators to ensuring that students have equitable access to learning. (Anderson, Boyle, & Deppeler, 2014; Frielick, 2004; McLinden, 2017; McLinden, Douglas, Cobb, Hewett, & Ravenscroft, 2016, p. 179). In their analysis of policy implementations for equitable practices in education, May and Bridger (2010) described using ecological systems theory to understand the institutional change process within the broader environment, noting that "all institutions operate within a socio-political context and do not act insolation of one another" (p. 89; see also Figure 3). May and Bridger propose using the hierarchical model of ecological systems theory to describe "the layers of influence" that exist within an institution (p. 89). McLinden (2017) underscores the importance of understanding such layers of influence and the interactions that occur within and between them to "… reinforce the finding that it is necessary to target both institutional and individual factors to bring about sustainable change" (p. 378).

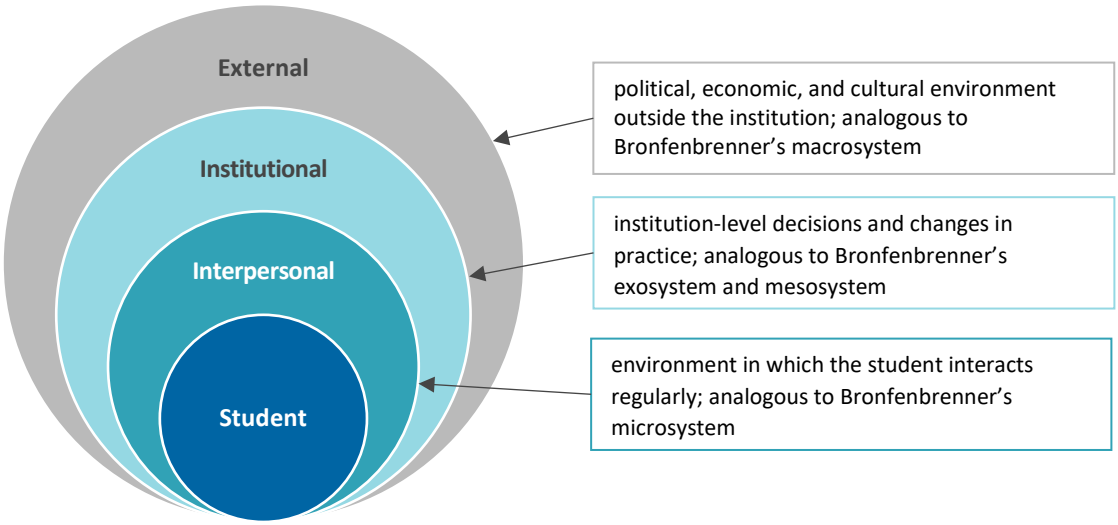
Figure 3
May and Bridger's Adaptation of Ecological Systems Theory for Higher Education



Note. Figure adapted from May and Bridger (2010, p. 89).

We apply ecological systems theory in a similar way in our examination of advising redesign processes. This approach enables us to understand how internal and external forces influenced institutions' approaches to advising redesign work and how stakeholders developed their perceptions of advising work. The systems we examine in relation to advising redesign are illustrated in Figure 4.

Figure 4
Adaptation of Ecological Systems Theory for Advising Redesign



Compared with theories of organizational change often referenced in the higher education literature, which focus mainly on leadership strategies for fostering buy-in (see, e.g., Bolman & Deal, 2013; Kotter, 2012), ecological systems theory supports a more nuanced understanding of how change unfolds in a complex, bureaucratic, and dynamic organization where there are multitudes of norms, subcultures, and political structures. Colleges and universities, referred to by Weick (1976) and later others as *loosely coupled systems*, can be thought of as a series of semiautonomous units operating within a larger system, each with its own expertise, priorities, goals, and culture (Clark, 1983; Kezar, 2014; Weick, 1976). Implementing institutional changes in such settings is especially challenging, as changes must be conceived of, planned for, implemented, adopted, and executed by distinct groups of stakeholders. Simply looking at change processes in these organizations through a leadership lens or a single structural theory may not facilitate an understanding of the intersections of multiple structures and diverse individuals within an

institution. Adapting Bronfenbrenner's ecological systems theory provides a meaningful structure for our inquiry into the dynamics that influence institutional and individual experiences with advising redesign while accommodating the complexity of the loosely coupled systems where our study takes place. Through this inquiry, we are able to identify why the original of theory of change for iPASS may have missed some influential aspects of the institutional environment that can affect implementation.

3. Method

The research for this report was conducted as part of a larger qualitative study examining the implementation of technology-mediated advising redesign efforts at seven community colleges and two broad-access four-year universities. These nine institutions were part of a cohort of 26 colleges and universities that received iPASS grants from the Bill & Melinda Gates Foundation and the Leona M. and Harry B. Helmsley Charitable Trust.

3.1 Site Selection

Given our interest in using ecological systems theory to develop a detailed understanding of the range of external and internal dynamics affecting the implementation of advising redesigns, we opted to limit our analysis to four of the nine institutions included in the qualitative research in order to be able to present an in-depth description of each institution's ecosystem. We selected the four institutions based on variation along two key dimensions— institutional sector and geographic location. This resulted in a sample consisting of two community colleges and two four-year universities, each of which is in a different state—one in the South, one in the Midwest, and two in the Southwest.

Table 1
Institutional Characteristics

	Region	Urbanicity	Undergraduate Enrollment	Acceptance Rate[a]	% Full-Time	Graduation Rate[b]
Community College A	Southwest	Rural	6,000	Open admission	60%	30%
Community College B	Midwest	Town	1,000	Open admission	60%	30%
University A	South	City	19,000	60%	80%	50%
University B	Southwest	City	27,000	80%	80%	60%

Note. Data are from the U.S. Department of Education's College Scorecard. All numbers are rounded.

[a] Share of first-time students who applied to this school that were accepted.

[b] Share of students who graduated within eight years of entering.

Table 2
Student Demographics by Institution

	Pell Grant Recipients	White	Black	Hispanic	Asian
Community College A	50%	15%	< 5%	75%	< 5%
Community College B	20%	90%	< 5%	< 5%	< 5%
University A	40%	60%	20%	5%	< 5%
University B	35%	60%	< 5%	25%	< 5%

Note. Data are from the U.S. Department of Education's College Scorecard. All numbers are rounded.

3.2 Participants

Between March 2016 and October 2017, we conducted 132 interviews and focus groups with 121 individuals across the four sites. The two community colleges participated in two rounds of data collection. Twenty-three individuals across those two colleges participated in both rounds of data collection.

College staff were categorized as one of three types: administrators (those in leadership positions, such as the president, vice presidents, and deans, who had decision-making authority but were not directly involved in the implementation of advising redesign efforts); key personnel (any participant who was involved with a planning or implementation team for advising redesign efforts, including administrators, faculty members, and student services staff); and end users (those whose jobs involved using

advising technologies and working with students, such as faculty members and advisors). While there was some crossover in these roles, we categorized participants according to the role that was most relevant to the study. Given the study's emphasis on advising, we conducted additional focus groups with advisors at the two universities that only received a single site visit in order to reach more advisors. We also conducted one-on-one interviews with students from each of the four sites. Tables 1 and 2 show the number of interviews and focus groups conducted per institution and the breakdown by participant type, respectively.

Table 3
Number of Interviews and Focus Groups

	Individual Interviews	Advisor Focus Groups	Total
Community College A	39		39
Community College B	45		45
University A	31	1	32
University B	14	2	16
Total	129	3	132

Note. The community colleges participated in two rounds of data collection; the universities participated in one round.

Table 4
Number of Participants by Type

	Administrators	Key Personnel	End Users	Students	Total
Community College A	5	9	6	8	28
Community College B	3	10	13	7	33
University A	5	6	9	17	37
University B	2	8	11	2	23
Total	15	33	39	34	121

Note. The community colleges participated in two rounds of data collection; the universities participated in one round.

3.3 Data Collection and Analysis

Interviews and focus groups were conducted using semistructured interview protocols designed to provide insight into the implementation and adoption of advising redesign efforts. Protocols were tailored for each participant type. For example, the protocol for administrators included questions about financing advising redesign efforts, while the key personnel protocol included questions about communication and training related to launching new technologies, and the end user protocol included questions about interacting with students and using technology. The student protocol focused more broadly on students' college experiences, particularly with advising.

Interviews and focus groups were audio recorded and transcribed. Transcripts were uploaded into the qualitative analysis software Dedoose for coding and analysis. Before we began coding, we created a comprehensive list of a priori codes based on the interview protocols. These codes covered a range of general implementation topics, such as the structure of advising services, technologies being used on campus, communication and training related to advising redesign efforts, goals for the work, other student success initiatives happening on campus, changes resulting from redesigning advising, and successes and challenges. For a full list of codes used, see Appendix A.

During the first phase of coding and analysis, the research team applied the a priori codes, making adjustments as needed. During the second phase of coding, we reviewed the code list and categorized codes based on which level of the ecosystem we hypothesized they would relate to most directly. For example, we looked at "challenges with funding" as a way of understanding dynamics in the institutional environment and "advising philosophy" as a way of understanding interactions in the interpersonal environment. See Appendix B for a table mapping codes to levels of the ecosystem. We placed a few codes in more than one level of the ecosystem, but most were placed in only one. Not all codes are included in the ecological systems list.

To test our hypotheses, we pulled all excerpts for the codes associated with each level of the ecosystem by college. We then created a spreadsheet for each college where we began identifying themes according to ecosystem level. Themes were discussed and refined by the authors during weekly meetings and were vetted with larger teams at several critical junctures.

3.4 Limitations

It is important to note that this study is limited in several ways. Because the work took place over several years and was part of a set of related projects, the theories and understandings around this work evolved over time. For instance, ecological systems theory was not an original theory used to develop interview protocols and a priori codes, though it emerged as a highly relevant theory over months of data analysis. Had this theoretical approach been incorporated into the study's original design, we likely would have asked additional questions pertaining more directly to participants' perceptions about the external and internal dynamics influencing advising redesign efforts. However, the consistency with which the theory could explain themes emerging from the data even in the absence of direct questions in the interview protocols suggests that the framework is a useful one for understanding change in a complex ecological environment such as ours.

Additionally, although the choice to focus on four of the nine colleges included in the larger qualitative study was intentional, it did involve choosing depth over breadth. As mentioned, however, we believe the variation offered by the sites we selected provided ample opportunity for rich analyses.

Finally, while ecological systems theory is well suited to examining the range of dynamics affecting an individual's experience, we are not able to make direct claims about the effects of advising redesign efforts on students. Due to recruitment challenges, the amount of student data we collected at each of the four institutions was uneven (ranging from two to 17 interviews), making it difficult to identify common trends in students' perceptions of advising. Additionally, we are not able to link the qualitative student data to data on student outcomes. In several cases, the timing of the interviews in relation to the implementation of advising redesign efforts also prevented students from being able to talk about the work because the changes were still in process, and students had not yet experienced them. Nonetheless, the students with whom we spoke were able to provide critical insight into their college experiences and preferences related to advising and other support services.

4. Findings

In our analysis of perspectives from a diverse group of stakeholders across four institutions, several themes arose that offer insights into how external and internal dynamics affected the complex, iterative, and demanding work of advising redesign. In this section, we discuss how these dynamics operate in our three interrelated contexts: the external environment, the institutional environment, and the interpersonal environment.

4.1 External Environment

When asked about what drives their advising redesign work, participants across all four institutions consistently referred to three dynamics in the broader political, cultural, and economic environment, to which they attributed an increased urgency at their institutions to improve student outcomes:

1. national college completion organizations and initiatives,
2. state higher education policies related to college completion, and
3. state and local economic conditions.

These dynamics presented both opportunities and challenges, which combined to create a culture of student success on each campus driven by practical and financial necessities to retain more students and by positive incentives and supports for doing so. Although students were most likely unaware of these external dynamics, they may have directly and indirectly shaped the institutional contexts that affect the student experience.

Below, we describe both how these dynamics have developed nationally and how stakeholders across the four institutions in our study responded to them, along with implications for the implementation of advising redesigns. Table 5 summarizes the dynamics that were most salient for each of the four institutions.

Table 5
External Dynamics

Institution	National College Completion Organizations and Initiatives	State Policies Related to College Completion	State and Local Economic Conditions
Community College A	• Involvement in ATD • CCA active in shaping state policy	• Performance-based funding	• State cuts to higher education • Declining enrollment
Community College B	• Involvement in multiple completion efforts (ATD, Completion by Design, guided pathways)	• Performance-based funding	• Decline in the region's student-age population • Strong economy reversing increases in community college enrollment following Great Recession as people choose work over further education • Declining enrollment partially offset by increase in high school dual enrollment population
University A		• Performance-based funding • Campaign to increase the percentage of state residents with a postsecondary credential	
University B	• Participation in the American Association of State Colleges and Universities' Re-Imagining the First Year of College project	• Completion goals set by the board of regents for the state university system	• Deep state cuts to higher education • Increasing enrollment

National college completion organizations and initiatives. After college graduation rates became more widely available in the 1990s, greater public scrutiny of student outcomes and growing awareness of the large numbers of students failing to obtain a credential shifted the higher education discourse from a focus on access to one on completion (Bailey, Jaggars, & Jenkins, 2015; Harbour & Smith, 2016). The national college completion organizations and initiatives in which the four colleges in our study are involved grew directly out of this movement and are dedicated to promoting institutional improvement and advocating for policy changes to increase student success. The leading organizations in the field have a wide reach. For example, Achieving the Dream (ATD) works with 277 colleges in 44 states,[2] and over 40 states, regional consortia, cities, and counties have partnered with Complete College America (CCA).[3]

[2] https://www.achievingthedream.org/our-network
[3] https://completecollege.org/alliance/

Furthermore, although participants rarely spoke directly about how receiving the iPASS grant in and of itself shaped their approach to redesigning advising, it is worth noting that in many ways, the grant was also a reflection of the national completion movement. The grant was framed around the need to improve student success and set an ambitious, albeit aspirational, target of increasing student retention by 10% over the course of the three-year grant period.

Reflecting the extent to which the completion movement is impacting institutions on the ground, participants described three ways in which national nonprofit and advocacy organizations, such as ATD and CCA, are affecting their approach to student success:

1. connecting them to national conversations about the latest innovations in higher education,
2. providing technical assistance, and
3. advocating for national and state policy reforms.

The importance of Community College B's involvement in efforts such as ATD, guided pathways, and Completion by Design was a common refrain among those we spoke to at the college. Speaking about how influential the college's involvement in these initiatives had been in connecting the school to larger higher education conversations and in fostering commitment to the work of reform, one administrator commented:

> Becoming an early Achieving the Dream college, becoming a leader college, winning awards has kept [the college] very much in tune and in the forefront of this ongoing change. There's a real spirit of being included in these kinds of initiatives.

As an example of the ways in which ATD had kept the college at the forefront of change, a member of the advising redesign leadership team credited the college's decade-long involvement in ATD with putting the college ahead of the curve in implementing policies such as mandatory advising requirements for first-year students and mandatory participation in a first-year experience course.

Interviewees at University B expressed similar sentiments about the significance of the university's participation in the American Association of State Colleges and Universities' Re-Imagining the First Year of College project (https://aascu.org/RFY/), an initiative that brings colleges together to share ideas about how they can better support

first-year students, particularly historically underserved populations of students. One of those individuals described the initiative as "a real, nationally recognized program" and commented that the intensive focus on the first year of college was profiled in a recent book by John Gardner as "one of the great national best practices on student success." Though it is not a solely advising-focused project, Re-Imagining the First Year of College was perceived as complementing the advising redesign work at the university, and some individuals participated on the leadership teams for both projects.

In addition to keeping the colleges abreast of national trends, interviewees at both community colleges talked about how participation in ATD better equipped their institutions to enact change. For example, stakeholders at Community College A indicated that receiving technical assistance from ATD helped the college build institutional capacity for student success. One administrator stated:

> I think being an ATD school has made a difference because there's this combination of student success and building capacity institutionally. … But I think ATD's emphasis on how you build capacity within the institution to do that, I think that's been influential for us.

Another administrator at Community College A described belonging to ATD as "invaluable to my staff" because the support they received from ATD coaches enabled them to make connections across student success efforts. Similarly, a leader of the advising redesign at Community College B attributed upper level administrators' ability to communicate their vision for student success to their active involvement in ATD.

Finally, in addition to directly influencing the member institutions with whom they work, national student success organizations are indirectly influencing colleges by shaping higher education policy. An administrator at Community College A appreciated that the college was in a state where CCA was actively involved in promoting policies designed to improve student success:

> Complete College America as a statewide agenda—this is my second state where Complete College America has kind of driven state policy … and I can say for me, as a leader who is trying to change a type of institution that is historically resistant to change—and I'm not talking just [name of institution]; higher education is slow to change—I think one of the drivers that has been helpful for us is a statewide policy that really pushes completion.

State responses to the completion agenda. A growing number of states and state higher education systems are responding to the college completion movement by using legislative and budgetary mandates to prioritize student success and by launching campaigns to increase the percentage of residents who hold a postsecondary credential. As of 2017, 35 states had adopted performance-based funding policies that tie at least a portion of state funding for higher education to student outcomes rather than simply enrollment numbers (Hillman, Hicklin Fryar, & Crespín-Trujillo, 2018). As of early 2019, 42 states had also set college attainment goals (HCM Strategists, 2019). These policies are front and center for many colleges that rely on state funds and thus drive decision-making.

University A and Community College B are both located in states that have enacted sweeping mandates for public postsecondary institutions, including policies related to developmental education, dual enrollment, and performance-based funding. While performance-based funding models vary widely from state to state, the models used in the states where these two institutions are located have both been categorized as high-stakes (involving over 25% of state funding, at least a portion of which is base funding) (Snyder & Boelscher, 2018). Though performance funding can be a contentious issue, particularly when it is high-stakes, leaders at both institutions portrayed it as a driver for change. According to an administrator at Community College B:

> In [our state], we get funded based on completion. So that's a driving force for changing that focus … improving our completion, which in [our state] is a really big deal because of the way we get funded, as it should be everywhere.

Illustrating the extent to which institutional priorities are influenced by the wider sociopolitical environment, a midlevel administrator at University A identified performance-based funding and the governor's initiative to increase the percentage of residents with a college degree as the primary reasons the university invested in developing a comprehensive student success agenda. Signifying how widespread these pressures are, she also hypothesized that the state's performance-based funding model could be related to national mandates to increase completion rates:

> This may be national as well, but the state mandate for schools to improve their retention and graduation rates, that was the driving force. Before, we would be funded based on the number of students that we get in—on the headcount enrollment. That was

> good, but they wanted to see the end product, end result. Okay, we are getting them in, so how many are we getting out? So that prompted us to come up with that [student success agenda]. That was driven by that, and the governor's [college completion initiative], all of that.

While University A and Community College B are located in states that have had some version of performance funding in place for many years, Community College A is in a state that only enacted a performance funding policy a few years prior to the iPASS grant and where only a low level of state funding (under 5%) is tied to performance metrics (Snyder & Boelscher, 2018). Although the participants who mentioned this policy did not know how much funding was tied to student outcomes, an administrator explained that simply knowing the policy was in place served as a "much bigger incentive" that was forcing them "to get our act together when it comes to students being retained and completing."

Speaking more specifically about how the existence of the performance funding policy affected the implementation of the college's advising redesign work, the same administrator quoted above noted that the college had made a deliberate effort to emphasize how the adoption of new technology tools could help departments achieve their completion goals. One of the advising redesign leaders at Community College A also indicated that performance funding was trickling down to affect work on the ground, noting that the policy had contributed to an "urgency to help students succeed … at all levels—at the regent's level, at the chancellor's level, at the provost level, at the dean's level, at the college level, all the way down to operations."

University B was the only institution of the four that was not located in a state with performance funding. However, university policies were strongly affected by the governing board for the state college and university system, which had instituted a set of required metrics compelling schools to reach specified goals for retention; completion; and, for universities, research expenditures. Rather than considering these requirements a burden, university stakeholders viewed the goals set by the board as an opportunity to reframe the institution's strategic approach. According to an advising redesign leader at the university:

> It's all brand-new. So we have long lists of tasks ahead of us, and so it is a matter of forging through the list and figuring out how

> those priorities for cleanup and expanding our capacity align with the strategic plan, the strategic plan being at the heart of the whole thing—what is the number one priority for the institution? And a lot of that ties to the [governing board] enterprise metrics, which have to do with retention, student success, graduation rates, increasing research expenditures. … We have goals out to 2025, and every year we are judged based on how well we do towards our yearly goal. And so those will be a guiding factor in how we tackle the issues.

State and local economic conditions. In addition to the college completion movement, state and local economic conditions formed critical parts of the context in which institutions were operating. Financial resources are hugely influential in shaping how colleges and universities do their work, and the current economic environment for higher education is a challenging one. Paradoxically, states are reducing (in some cases dramatically) higher education budgets while demanding improvements in student outcomes. Between 2008 and 2018, state funding for public two- and four- year institutions declined by nearly $7 billion dollars, with per-student spending decreasing by an average of $1,220 (13%) in 41 states (Mitchell, Leachman, & Saenz, 2019).

Other factors largely beyond colleges' control, such as changing demographic and enrollment trends, have also contributed to budget constraints (Grawe, 2018). Data from spring 2019 indicate that college enrollments have fallen eight years in a row (National Student Clearinghouse Research Center, 2019). In part, enrollment decreases can be attributed to the strengthening economy following the Great Recession of the late 2000s. Following historical trends, community college enrollment increased while unemployment was high, during the peak of the recession, and decreased as the labor market recovered (Pennington, McGinty, & Williams, 2002; Romano & Palmer, 2016; Witt, Wattenbarger, Gollattscheck, & Suppinger, 1995). Other factors contributing to enrollment decreases are declines in the traditional college-age population, particularly in the Northeast and Midwest, and population growth among socioeconomic groups that historically have had lower college-going rates (Grawe, 2018).

University B is in a state that has made some of the most aggressive cuts to state funding for higher education in the country over the past decade. According to one participant, the amount of the university's funding received from the state declined by over 30 percentage points in two years. One advisor said:

> This is heinous, what they have done to higher education. I pay taxes. I'm willing to pay higher taxes to fund higher ed. They decimated the budget here in ways that are ridiculous. ... We're [low-ranking] in the nation, and we cut more from our budget than any other state in the country. … It's terrible.

Forcing limited financial resources to stretch even further, University B experienced what one of the leaders of the advising redesign described as an "exponential growth" in enrollment around the same time its budget was being slashed. The year the iPASS grant started, its main campus alone added close to 1,000 students.

While University B was struggling to keep up with increases in enrollment, Community College A was in the far more common position of grappling with declining enrollment and the related decrease in tuition dollars. One administrator said:

> [Community College A is] 44, 45 years old. For probably 40 of those years, enrollment has been straight up, and in the last three to four years, enrollment has been flat at best and down. So I think that circumstance has created some urgency—like, wait, what do we do?

Like University B, however, Community College A is in a state where budget cuts to higher education are a significant concern. An administrator at Community College A said the state funding problems were having a marked impact on the college, although advising staff had not yet been affected:

> The governor of [state] vetoed the entire higher ed budget out of the legislature last year. So there were times when we didn't know what the loss [was], what we might get cut by the state. So we were freezing positions. We never froze advising positions. As soon as one became available, we immediately hired.

Commenting on the cumulative effect of state budget cuts and declining enrollment, a student services staff member at Community College A noted that budget shortages had led to staffing cuts, resulting in the reallocation of job duties among remaining staff:

> Enrollment has declined somewhat, or flattened out. We were flat last year, we declined a little bit this year. Then, of course, the state has been cutting educational funds at all levels, but higher education took a pretty good hit last year, and so, you know, we have to cut someplace. And in some instances, those positions that aren't deemed—I mean … I hate to say they are not essential, but,

> you know, some of those duties can be absorbed … within other areas and spread out over several people—then that's occurred.

Community College B, in situation similar to Community College A's, had also been experiencing declines in enrollment for several years before its receipt of the iPASS grant. Administrators at the college attributed the decline to two main factors: a strong economy that was encouraging people to work rather than pursue further education, reversing increases in enrollment following the Great Recession, and a decline in the region's student-age population. At its peak in 2014, the college served close to 4,000 students. Currently, enrollment stands at just over 2,200 students. As a result of these trends, Community College B experienced over a $2 million deficit shortly before the start of the advising redesign project. The college went through two rounds of staff reductions in two years, impacting nearly 40 positions and leading to a downturn in morale and increased anxieties over job security.

Complicating matters further, at the same time enrollment among traditional-age and adult students was declining, mandates from the state higher education department drastically expanded dual enrollment programs. As a result, Community College B's dual enrollment population grew to nearly half the student body. Although increases in the dual enrollment population partially compensated for declines in the traditional student population, the rapid shift to serving a large proportion of younger, part-time students presented challenges for the small, rural college. Not only was the college coordinator for dual enrollment stretched thin when the number of high schools with which the college was partnering doubled from 20 to over 40, but the college was also struggling to enroll dual enrollment students as college students after they graduated from high school. Not atypically for the region, many high school graduates were choosing not to pursue a college education, while those who were highly successful in accumulating college credit hours through the dual enrollment program were electing to enroll in a four-year college rather than stay at Community College B.

The combination of these demographic and enrollment trends without increased funding from the state created significant fiscal pressure at Community College B to increase completion rates. One administrator who was serving in a leadership capacity for the advising redesign went so far as to suggest that the college's survival would depend

on its ability to compensate for budgetary shortfalls and the lack of new funding by increasing completion rates:

> How do we, in the public sector, do more with less? I mean, I think I've been hearing that my whole career. But really, if we are going to exist in 10 years, we really do have to do more. We really do have to get more students to graduate. There's no new money coming in.

Summary

- Involvement with national organizations and initiatives helped lay the groundwork to enact institution-wide changes, particularly with regard to accessing and using data for improvement.
- Institutions feel pressure from states to increase college completion through student success initiatives, but the focus on student success aligns with institutional mission and values.
- Some of the biggest challenges facing colleges have to do with funding cuts and shifting enrollment trends.
- Together, these dynamics have produced an intense focus on student success.
- At the same time, these dynamics have created an environment in which colleges and universities are being asked to do more with less.

4.2 Institutional Environment

Although colleges and universities are often responding to similar pressures from the external environment and adopting similar reforms, the four institutions' approaches to implementing technology-mediated advising redesigns were heavily influenced by their unique institutional dynamics. Responses to resource constraints, governance structures, and institutional change management strategies all played significant roles in shaping redesign efforts. Table 6 summarizes the dynamics that were most salient for each of the four institutions.

Table 6
Institutional Dynamics

	Resource Constraints	Centralization of Advising Policies and Procedures	Approach to Managing Institutional Change
Community College A	• Unable to hire desired additional advisors	• Part of a statewide university system, so technology had to be approved and implemented system-wide	
Community College B	• Restricted choice of technology system		• Invested in efforts to combat initiative fatigue: ○ Adopted change management model focused on including all college stakeholders in efforts to achieve short- and long- term goals ○ Created framework illustrating relationship between initiatives and connections to larger goals
University A		• Difficult to standardize use of technology across a large, decentralized institution	• Multiyear strategic plan used as rallying point to foster university-wide commitment to improving student success by focusing on four target areas, one of which was advising
University B	• Low salaries led to high turnover among advisors • Unable to afford licenses for all possible technology users	• Advising coordinator was hired to standardize advising practices and policies across a large, decentralized institution. Advisors appreciated this in theory but found it challenging in practice.	• Lack of a unifying vision/top-down approach to change

Resource constraints. At all three institutions wrestling with challenging state and local economic conditions (University B, Community College A, and Community College B), budget constraints affected multiple aspects of the implementation of advising redesigns, including which technology systems colleges could buy, the number of user licenses they could afford, and staffing.

At University B, financial limitations created human resource pressures and restricted the ways in which the university was able to use new technologies as part of the advising redesign. Low salaries for advisors in conjunction with limited opportunities for advancement resulted in a high turnover rate; one department lost three of its four advisors in a single year. According to one of the advisors, these conditions had created a culture in which most advisors viewed the job "as a stepping-stone to something else." The combination of drastic budget cuts, rapid enrollment increases, and high turnover rates among advisors also meant that staffing could not keep pace with the dramatic growth in the student body. Advisors were struggling to understand why they were being asked to do more when the number of advisors was not changing. Regarding the impact of budget cuts, one advisor said, "Financially, something has to give. I just wish it wasn't being done on the shoulders of advising, and I feel that's what is happening." Furthermore, due to the per-person cost of licenses for the new technology system, University B could not afford to allow student workers to use it. As a result, student workers were no longer able to assist advisors with some of the administrative aspects of enrollment, increasing advisors' workloads and exacerbating human resource constraints at the university.

At Community College B, financial constraints limited the college's choice of technology systems. Rather than purchasing the system advisors preferred, the college had to settle for a less costly system that proved difficult to customize for the institution's needs. One of the leaders of the advising redesign voiced frustration with these financial constraints:

> It's because we are small, and we can't afford, you know, things like [popular early-alert system]. We probably would have been way better off going with a product like that, but the cost was significantly less going with [technology system the college purchased]. … But it's been disappointing.

With an average student–advisor of around 700 to 1, advisors at Community College A were clearly overextended. An administrator commented, "There is a real problem with

advising. We don't have enough advisors." Advising redesign leaders at the college had hoped to hire more advisors as part of the work, but budget shortages meant they could only afford to purchase technology and train existing staff. An administrator stated:

> We will implement the technology and train the current staff because right now there is no new money. … We are having to cut this year's budget by just a little bit, and then next year's budget is going to be cut quite a bit, and so there is no new money for new advisors. One of the project leaders overseeing the advising redesign stressed that the inability to hire more staff inevitably slowed down implementation because it required asking existing, already overburdened staff to take on more work. So I think one of the biggest challenges is that there was no additional staff brought on with this project, so it's been slow-moving. … Without additional staff, it has been a challenge because you are just assigning more work to staff.

Centralization of advising policies and procedures. Each of the institutions in this study operated under a different governance model. The degree to which authority for decision-making was centralized or decentralized directly affected the implementation of advising redesign efforts.

A large university, University A was set up as a decentralized institution whose seven colleges have traditionally exercised a fair amount of autonomy in setting policies and procedures. Approximately two years prior to receiving the iPASS grant, the university created an office dedicated to overseeing student success initiatives in an effort to centralize the management of a variety of programs and foster university-wide support for the work. Advising reforms focused on developing data-driven advising practices are a core component of the efforts overseen by the student success office. To create a culture of data-informed decision-making, leaders of the advising redesign were especially interested in standardizing the use of new advising technologies. With the number of academic programs housed in each college ranging from five to 40, however, it was challenging to implement standardized practices both within and across colleges.

Like University A, University B had historically taken a decentralized approach to governance. The institution is subdivided into eight colleges, each of which had developed its own methods of advising. After identifying advising as a core strategy for increasing retention and completion, however, the administration quickly realized that changes to enhance the delivery of advising services would be far easier to implement under a more

centralized advising model. Thus, a key part of University B's advising redesign involved the creation of a new position for an advising coordinator to oversee advising in all eight colleges and to develop more consistent advising policies and practices.

In particular, participants at University B identified a need for greater consistency in the criteria for determining when students transition from working with professional advisors in the new student advising center to working with faculty advisors in their program of study. Additionally, several leaders of the advising redesign hoped to use the centralized advising model to reallocate advising caseloads more equitably across the university and to standardize hiring and employment policies for advisors. Under the decentralized model, no single person had the authority to enact these kinds of policy changes.

As at University A, part of the rationale for centralizing advising at University B stemmed from a desire to standardize use of new advising technologies. As a leader of the advising redesign at University B explained:

> One of the challenges we could have had in a decentralized advising structure is [that] people would adapt these tools at different rates and based on their culture. So the idea of having the coordinated advising was to be able to set specific standards for all of the advisors and also have specific expectations for use of these tools.

Overall, advisors at University B understood and appreciated the goal of adopting a centralized advising structure to provide more consistent advising experiences for students. Nonetheless, moving to a centralized model in a decentralized institution was not without its challenges. For example, one advisor noted that differences between academic programs made it difficult to standardize policies:

> Our colleges are so different. … If you go talk to [advising director] at [the liberal arts college], they're managing such different things than we are. Their degrees are really personalized via faculty, and they can take things in any order they want, whereas with us, it is totally lockstep. We're very different. We're more a professional school. Basically all but one of our programs [have] national accreditation issues, so we have to make sure we meet all those guidelines.

Given that advisors still work within a college, another advisor at University B said the addition of a central advising coordinator had complicated lines of communication and authority, "so it makes my job a little bit more complicated because I kind of feel like I go to this person for this and the next person for that."

As a small community college serving slightly under 6,000 students, Community College A was far more centralized than the two universities. Although there were some differences in policies among academic programs, such as those related to transitioning from new student advising to faculty advising, those differences had little direct impact on the implementation of the college's advising redesign. The most salient governance issue for Community College A was the fact that the college is situated within a statewide university system—essentially meaning that governance was centralized at a higher level. According to one advising reform leader, "It's a bit complicated because we are one of 10 colleges in the [university] system of campuses, and we are a system within a system."

On one hand, Community College A was able to work productively with the university to align programs of study and ensure students could transfer smoothly from two-year to four-year programs, particularly in STEM fields, which were heavily emphasized at all institutions and a strong focus of advising redesign work at Community College A. On the other, being part of a large university system created complications for the advising redesign. Because the institutions were highly integrated and governed by one system, any technology purchases had to be acquired through the information technology (IT) office at the flagship university, and college staff felt compelled to accept the technology system that the central IT office preferred. Ultimately, the central IT office chose the technology that it believed would be easiest to integrate with existing tools rather than the one that advisors at the college thought would best suit their needs. As one participant explained:

> It was a tough process because I think the advisors wanted either [technology company] or [technology company]. I think they were more comfortable with that. [University system IT department] wanted [different technology company product], and so there was a lot of talk of, "Well, our chancellor wanted as many products from the same company as possible." So there was that big push, and I think, my concern was that if we didn't kind of go with what [the university system IT department] was recommending, the chancellor and the provost wouldn't support it.

The benefits of going through the central IT office were the ability to share costs with the university and scale reforms across the entire system. However, the university was also more bureaucratic than Community College A, significantly slowing down the purchase and implementation of technology for the advising reform at the college.

Describing the process of working with the university system, an administrator identified the biggest challenge as, "trying to move a university [that] moves really slow, because we think of ourselves as jackrabbits, and we think of the university as kind of a tortoise."

Approach to managing institutional change. In addition to advising redesign efforts, all four institutions had multiple other student success efforts underway. Interviewees reported receiving a variety of information about changes, activities, and expectations in relation to student success work and expressed a range of reactions from frustration to enthusiasm. Though advising work was central for some stakeholders, it was often viewed as just one of many efforts taking place at the colleges. While this situation is not uncommon in educational institutions, it did present some challenges for stakeholders in terms of understanding the big picture and how the advising work fit in.

At University A, college leaders brought advising redesign under the umbrella of a multiyear strategic plan focused on increasing student success by making improvements in four main areas: advising, classroom instruction, academic support, and communication. Stakeholders at the university reported that the branding for the strategic plan created a shared understanding both of the university's broader goals and of the roles specific initiatives were designed to play in achieving those goals. This shared understanding helped foster a positive response from faculty and staff. Academic departments across the university, including STEM and liberal arts fields, were implementing changes in curriculum and processes they believed would improve student outcomes and experiences. Administrators began regularly reporting trends in student outcomes and celebrating improvements. Advisors were using data to identify and proactively reach out to students at risk of not completing their program, such as those in danger of losing scholarships due to a failure to meet GPA requirements.

In contrast, stakeholders at University B had trouble interpreting which changes were associated with advising improvements. Even though the university had a strategic plan, administrators had not clearly communicated how all of the many changes happening in a short period related to the strategic vision or included those most directly affected by the changes in decision-making processes. One advisor commented:

> [Communication and case management platform] rollout for academic advising was just not clear in general. It was fast, it was confusing, it was lacking in training. … I wasn't sure the reason

> behind the urgency to implement [new technology] and to stop using [old technology]. That urgency caused those who are on the ground using the programs the most to feel just completely bulldozed and left high and dry with nothing to do.

The lack of communication negatively affected buy-in among advisors, who felt excluded from the decision-making processes affecting their work. One advisor recalled "there were some conversations that were had [without advisors included] around how advisors should be integrated more into retention." Regarding technology, another advisor said, "I think one of the problems is the people that were putting this together are not people that use it the way we do; they are not advising students." Leaders, however, acknowledged the perceptions of advisors about their involvement in decisions. A member of the leadership team for the advising redesign at the university said:

> From our perspective, we think that we involve [advisors] in conversation, but what I've heard is they don't think that they were involved as much as they would have liked to have been. So that was a lesson learned in change management about multiple projects heading off at the same time.

At Community College B, the main challenge managing change was not so much communication as initiative fatigue. The sheer number of reforms the college had undertaken, as well as the extent of the changes being implemented, had come close to generating widespread burnout. Describing the effects of implementing significant changes to the core general education curriculum, reducing the number of required program credit hours, implementing guided pathways, and redesigning developmental education within a six- to 12-month period, an administrator who was also a core leader of the advising redesign acknowledged, "Everybody's exhausted because so much change has happened."

In response to the challenges posed by implementing multiple complex initiatives simultaneously, leaders at Community College B adopted a thoughtful and comprehensive approach to change management designed to foster buy-in and engagement. While many colleges superficially espouse the importance of student success, this institution-wide change management strategy enabled the college to truly operationalize its commitment to student success.

The first part of Community College B's change management strategy involved using a popular commercial method for setting short- and long-term goals and tracking

progress toward achieving those goals. An administrator noted that engaging in this process helped create a shared understanding that "we've got to focus" on completion, while a key project leader involved in the advising redesign commented that the system also enabled individuals to understand their personal role in achieving long-term completion goals.

In tandem with this process, administrators and leaders of the advising redesign developed a project-based framework that articulated the relationship between multiple student success initiatives and illustrated how each contributed to a coherent student success model. They also devised creative means for sharing this vision with the broader campus community, including a board game in which faculty and staff members were provided with a "cheat sheet" describing all of the various grants and initiatives the college was involved in and then asked how they would use those programs to support hypothetical students. A core member of the advising redesign leadership team stated that the activity helped people understand how different reforms supported the same goal— student success.

> We kind of made a game out of it and said, okay, here's your student, and here are the roadblocks they have, and here's what they're trying to do, and how would you use these different grants and programs and technology that's going to be available through these? How would you use them to help this person be successful? And I think that really helped. I think it helped them to see we're not asking you to do seven different things. Really, they're all the same thing, you know; they're all leading to the same point.

As at University A, because college leaders at Community College B devised a strategy for branding their student success work and bringing all of their ongoing efforts under one overarching plan, stakeholders seemed to more clearly understand how the advising work aligned with institutional goals.

Summary

- State funding cuts and fiscal constraints created by challenging state and local economic conditions directly affected staffing and technology for advising redesign efforts.
- Implementing new advising technologies and practices within large, decentralized universities and university systems requires extra time and effort to coordinate.
- Thoughtful approaches to communication and change management can ameliorate resource challenges and bureaucratic hurdles, but they must be tailored to the institutional context.

4.3 Interpersonal Environment

In many ways, students' experiences of advising are most directly shaped by one-on-one interactions with advisors. In part, those interactions are shaped by the unique ways in which advisors' individual knowledge, values, and beliefs inform their personal approach to advising. At the same time, the ways in which advisors interact with students are influenced by the larger external and institutional environments. Resource constraints stemming from state and local economic conditions affected advisors' capacity, while institutional infrastructure and approaches to change management affected advisors' engagement with technology-mediated advising reforms, as evidenced by advisors' statements about incorporating technology into their work with students. Table 7 summarizes the dynamics that were most salient for each of the four institutions.

Table 7
Interpersonal Dynamics

	Advising Approach	Advising Capacity	Reactions to Technology Adoption
Community College A	• Relationship building seen as foundation of advising	• Advisors stretched thin by large caseloads	• Limited information—advisors had limited exposure to new technologies to this point
Community College B	• Relationship building seen as foundation of advising		• Frustrations with technical glitches and delays in implementing new technology • Goal of using technology to offer more holistic view of students and facilitate proactive, personalized support understood and appreciated
University A	• Relationship building seen as foundation of advising		• Opinions differed across colleges within the university on utility of tools for different advising policies and procedures
University B	• Relationship building seen as foundation of advising	• Advisors overwhelmed by increase in enrollment and demands of new initiatives and technologies and feeling less able to deliver personalized support	• Technology too generic and does not facilitate personalized advising • Technology places extra burden on time • Technology cumbersome to use and does not provide benefits over existing systems

Advising approach. Other than engaging in standard advising activities, such as selecting courses, discussing program/major options, and ensuring students are on track to completion, the most notable aspect of how advisors across all four institutions approached their work was the extent to which they considered relationship building critical to good advising. Confirming the importance of relationships, students also

stressed how much they valued feeling like their advisor cared about them. According to advisors, the reason relationships are important is clear—they not only foster students' engagement with advising but also increase students' attachment to the institution. When asked about the best part of advising, a faculty advisor at Community College A said:

> The fact that you get to see the students outside of class … you [the student] see your instructors as humans, that we care about what and who they are and what their other interests are … their family, or their job, or whatever else interests that they have, you can run with that. … We're interacting, we're learning more about each other, we're sharing, and I think that lets a student into an institution, into a program. In the classroom, students listen to us. In advising, we're listening to them.

When asked the same question, a professional advisor at Community College B replied, "Just being that person … I feel like students, they feel better about coming to the college if they know they have a person that's in their corner that they can kind of talk to." Similarly, a faculty advisor at the college replied, "The relationships with the students that you can build … we are going to be together for two straight years … and I want them to trust me and the college. … Building that relationship is critical to those students."

Making a similar point, a leader of the advising redesign at University B noted that the frequency with which students meet with their advisors often depends on the type of relationship they have: "I know some students that really like their advisors and see them as a mentoring resource, so they stop in a lot. … I think that's really up to the student and the advisor and their relationship."

Illustrating the variety of ways in which advisors build relationships with students, one of the advisors at University B described his approach to advising as "teaching life skills" because of the range of issues that come up: "It could be anything from academics to how to interact with their roommate to how to have that tough conversation with their mom or dad." Another way advisors establish relationships is by sharing their own experiences to build rapport. An advisor at University A described drawing upon his background as a transfer student to help his advisees who have transferred:

> I had a bad experience my very first year, and I transferred. … So when I have students come in that had a bad experience and transferred to [University A], and they feel shameful for having to transfer and their previous grades … I will say, I did the same. … You're going to be fine. If you stay positive and establish these

> goals, you're going to do fine. And building that relationship where … we have the same experiences. I just know that I'm benefiting the student. … I'm helping that student based on my own experiences that are different but very similar.

Importantly, the benefits of a relationship-based approach to advising are not just one-sided. In addition to increasing student engagement, building relationships with students makes the job more meaningful for advisors. Describing the best part of his job, an advisor at University A commented, "I love the relational aspect of it. You know, I feel fulfilled when I'm helping them fulfill their potential."

When students said they were happy with advising, it was because the advisor was supportive and approachable. Students spoke highly of advisors who offered life advice and remembered their names, in addition to having knowledge of their area of study. When asked about satisfaction with advising overall, one student said, "Five out of five. It's amazing. I feel like they're personally interested. They're very attentive to their students." Another student who was a double major working with two faculty advisors noted:

> I feel like they've really taken the time to get to know me. … I don't want to say they're like a pseudo-dad or anything like that, but they seem to have my best interest in terms of me succeeding in the future.

Contrasting initial advising interactions with the help provided by an advisor with whom he developed a closer relationship, a third student said:

> My first semester, I kind of just came in whenever I needed help with picking classes, and I saw just random advisors. I never really established a relationship really with any of them. But the one that I know now, I just remember him helping me here one semester that I needed to sign up for classes, and he was just so different to the other advisors. Like, I could tell that he was taking his time with me. He didn't care how long it took as long as I understood; that was his priority. So I really appreciated that. That made him stand out from the rest of them.

Advising capacity. As a consequence of fiscal constraints stemming from external economic conditions, advising services at both Community College A and University B were underresourced. For advisors, the lack of adequate funding translated into large caseloads that limited their capacity to deliver the type of personalized support they value. Students too were frustrated when they felt as though advising appointments were impersonal and rushed.

At University B, the high student–advisor ratio was forcing advisors to reevaluate how they served students. For example, in the past, a course registration hold was placed on all new students until they met individually with an advisor. Given the increase in the number of new students without a corresponding increase in the number of advisors, however, the hold was eliminated, and advisors had to improvise strategies to accommodate more students, such as offering group advising sessions and drop-in advising hours.

Human resource challenges at University B were further amplified by the number of new initiatives in which the university was engaged. An advisor described being so consumed with the number of activities happening at the college that they were unable to effectively advise students, stating, "At this point, there are so many projects and things changing at the university, it has literally become full-time to deal with that. I really don't have time to meet with many students anymore." Feeling equally overwhelmed, another advisor took the opposite approach, choosing to focus on interactions with students rather than engaging in the advising redesign efforts happening:

> I'm giving my all to my students. I don't have time to write learning outcomes. I don't have time to talk about philosophies of advising. I don't have time to encourage my coworkers to get on board with advising-as-teaching.[4]

At Community College A, the inability to hire additional advisors due to fiscal constraints meant that existing advisors had high caseloads. With an average caseload of 700 students, advisors felt overextended. Adding to the workload, advisors often worked on multiple campuses. One advisor with a caseload of close to 900 students commented:

> I think I have just shy of 900 students, so I am stretched pretty thin. I'm in several different areas. I actually have two offices, so this is one of my offices, and I actually have an office at the [branch campus], so I am constantly busy no matter where I go.

When advisors are stretched thin, students are negatively affected too. Advising feels less personal, and students have a harder time getting the information and support they need. Describing a typical advising session, one student expressed frustration that

[4] In contrast with prescriptive advising, advising-as-teaching focuses on students' potential for success, academic and personal growth, and mastery of skills, along with the cultivation of a mutually trusting relationship between the student and the advisor (Crookston, 1972; Lowenstein, 2005).

appointments were rushed and that her advisor had difficulty keeping track of individual students' information but acknowledged that high caseloads made the job difficult.

> Honestly, it feels very rushed. It's about 15 minutes. Basically, she has a lot of people, and I can't blame her for that, and it's been like this with every advisor as well. They all have a lot of students, so it's hard to remember them and remember what classes they've already taken and what classes they need. So it's basically like every meeting starts the same, [with] her trying to figure out what I have and what I need. … It honestly feels like there is a little bit of wasted time there. I don't know, I just feel like it is not as personal as it probably could be.

Reactions to technology adoption. Ideally, the technologies launched as part of advising redesign efforts should change how advisors and faculty interact with students by enabling them to have more informed conversations and provide targeted support related to students' goals, academic progress, and barriers to success. However, the degree to which technology affects advising interactions depends on how advisors engage with the tools. Any number of factors can influence an individual's use of technology, ranging from basic functionality issues (whether the tool is working as intended) to the perceived utility of the tool, to having the time, training, and capacity to use the technology. While institutions cannot control all of these factors, variations in how individuals reacted to new technologies across the four colleges often seemed to reflect differences in institutional approaches to technology implementation.

Community College A's approach to implementation was most strongly influenced by bureaucratic barriers stemming from the centralization of policies under the university system of which it is a part. Due to implementation delays related to the need to coordinate across the university system, advisors at Community College A had had limited opportunities to use new technology at the time of our second site visit (approximately a year and a half after the start of the iPASS grant). One advisor noted:

> Quite honestly, I just started using it this past week. … So some of the training could've been done better, and I think that would've been more helpful as well. … But trying to get [the university system and Community College A] to all operate under one training is massively difficult because we all have crazy schedules.

Centralization also heavily influenced how advisors at University A reacted to the technology implementation, as it proved challenging to standardize the use of tools across

colleges accustomed to working relatively independently. According to an advisor at University A, the university's desire to implement technology using a "one-size-fits-all" advising approach could be counterproductive in practice. For example, the appointment scheduling and case management feature of one of the new tools worked well for tracking prescheduled advising appointments but was cumbersome to use retroactively for unplanned drop-in advising sessions. As the sole advisor for a relatively small program, this particular advisor had an open-door policy, allowing students to stop by at their convenience. Because the tool was not designed to record these types of interactions, the advisor simply did not use it, although he recognized that it was useful for other colleges that relied more on scheduled appointments: "Some other colleges use this, and they love some of the features that I don't want to touch … that aren't useful to me."

While institutional structure emerged as a significant influence on the technology implementation process at Community College A and University A, at Community College B and University B, individual reactions to technology appeared to be most strongly influenced by institutional communication and change management strategies. Despite technical glitches that delayed the implementation process and initially made some individuals wary of using new technology tools, faculty, advisors, and other staff members at Community College B understood that the goal of launching the tools was providing a more personalized advising experience as a result of having attended multiple all-staff and department meetings, trainings, and professional development workshops. One individual noted, "I think having that early-alert system and multiple resources for the student, and holistically advising and seeing the student … you know the big picture of the student." Another advisor expressed optimism about the technology and the recently implemented case management system, stating:

> I think the technology piece is going to be pretty critical to the advising. I think it's going to open so many opportunities that are not there now. … It's going to help us possibly identify students who are at risk much sooner. It's going to be able to help us maybe organize how often a student had been coming in for advising and what was discussed and what was the follow up that was needed.

In contrast with Community College B, where advisors and faculty were frustrated by technical problems but overall understood the benefits of the tools as a result of strong communication from college leader, advisors and faculty at University B

had far more negative opinions about technology due to a rushed implementation timeline with little communication from college leaders. Advisors at University B did not feel like their needs were taken into consideration and saw little benefit in adopting the new tools. Summing up these sentiments, one advisor commented:

> I feel like [education planning tool] is something they purchased and thought it was going to be a great idea. It's not doing anything different than what we already had, but they paid a lot of money for it, so we have to use it. But it seems that there are easier ways for us to get the information to students than by using [education planning tool]. … From what I've heard from all the other advising coordinators and advisors, everyone just kind of rolls their eyes, and they're like, oh, they don't want to use it.

Another advisor at University B was resistant to the technology both because "it's a lot of time consumption on top of trying to do our daily job" and because it did not align with their desire to personalize advising for students.

> That's the thing. … They're trying to streamline a thing that you can't really streamline. You know, you're trying to make everything the same when our students are so different. How I advise is very different than how [my colleague] advises, versus how [my other colleague] advises, and so that's why we each have our core group of students that we relate to on different levels. [Student] A may have these needs, versus student C doesn't.

The same advisor noted that these frustrations were amplified by a lack of communication from leadership about the technology—"we're not really sure what is going on."

Summary

- Advisors want to be able to build relationships with students and provide personalized support, but with caseloads of up to 900 students, they often lack the time and capacity to do so.
- Students are directly affected by advisors' capacity constraints. They value feeling cared about and are frustrated when advising is rushed and impersonal.
- Multiple factors affect whether individuals adopt technology, but institutions can increase individuals' willingness to adopt new advising tools by listening to end users' needs, communicating the tools' benefits clearly, and employing a change management strategy that links technology use to student success.

5. Discussion

Looking across the ecosystems in which institutions are embedded revealed that the colleges in our study confronted a variety of complex dynamics when undertaking technology-mediated advising redesign efforts. (See Appendix C for diagrams illustrating each institution's ecosystem.) Furthermore, there is a clear line from the external and institutional dynamics to the interpersonal dynamics that are at the core of the advising experience and meaningful to students' development.

For example, at Community College A and University B, unfavorable state economic conditions led to institutional resource constraints, which resulted in high caseloads for advisors that limited their capacity to provide personalized support for students. Community College A also faced the challenge of navigating highly centralized university system policies and procedures, which significantly delayed its technology implementation and prevented many of the planned advising redesign efforts from reaching advisors and students during the grant period. Like Community College A and University B, Community College B struggled with financial constraints stemming from the state and local economic environment. However, the college's involvement in national student completion movements and adoption of a comprehensive change management approach, combined with a push from state performance funding policies to increase student success, provided the language and tools needed to effectively communicate about advising redesign efforts and increase faculty and advisors' engagement despite financial limitations and technical challenges. Similarly, at University A, strong incentives to focus on student success created by state policies in conjunction with a widely communicated multiyear strategic plan united faculty and advisors around a common vision for student success, despite some challenges standardizing technology use across a large institution with highly decentralized advising policies and procedures.

Based on our observations at these colleges, a clear set of themes emerged regarding the challenges and opportunities associated with redesigning advising by leveraging technology. At the same time, the interaction of various internal and external dynamics at each college affected the trajectory of each institution's advising work differently, highlight the importance of revisiting the iPASS logic model in order to understand how an institution's ecosystem can affect its implementation process.

5.1 Economic Challenges

One of the most prominent challenges that emerged across institutional ecosystems was the negative impact of unfavorable economic conditions, whether due to state funding cuts to higher education or changing demographic and enrollment trends. Three of the four institutions were struggling with significant financial challenges that directly affected advising. Community College A was not able to hire the additional advisors it needed to reduce advising caseloads. Community College B could not afford the technology system that would have been most useful for advisors. At University B, low salaries played a role in high turnover among advisors, and staffing could not keep up with increased enrollment. Additionally, the university had to limit the number of technology user licenses it purchased.

5.2 Motivations for Focusing on Student Success

One of the clearest opportunities for advancing redesign efforts arose from the positive impact of external and internal forces—ranging from national completion organizations to state mandates and initiatives, to institutional change management approaches—that provided a rationale and an organizing framework for envisioning and enacting institutional change to promote student success. All four institutions faced pressure from the external environment to increase retention and completion rates. Community College A, Community College B, and University A were located in states with performance funding policies, and the governing board overseeing University B had recently set ambitious completion targets for the entire state college and university system. Inevitably, such pressure places stress on institutions, particularly in the face of budget cuts and resource limitations. Overall, however, rather than reacting to this pressure negatively, stakeholders from all four institutions indicated that the state or system mandates motivated their investments in efforts to increase student success.

All four institutions were also engaged with national or state completion initiatives that provided frameworks for promoting advising as a strategy for reaching completion goals: Both community colleges were involved in ATD,[5] and University B

[5] https://www.achievingthedream.org/our-services/holistic-student-supports-redesign-coaching-program

was involved in the Re-Imagining the First Year of College initiative.[6] Stakeholders at University A, meanwhile, attributed the amount of attention given to the university's strategic plan, of which advising was a core pillar, to the state's initiative to increase the percentage of residents with a postsecondary credential.

Importantly, these external motivations for focusing on advising and student success aligned with advisors' beliefs in the importance of providing personalized support for students. Yet while this alignment creates a powerful opportunity to obtain buy-in for advising redesign efforts, it is not always sufficient. At University B, for example, the capacity issues advisors were struggling with trumped other concerns and limited their willingness to engage in new initiatives.

5.3 Implications for Revisiting the iPASS Logic Model

Using our adaptation of ecological systems theory to examine the implementation of advising redesign efforts surfaced a number of complex dynamics in the external environment that are not typically included in theories of change or logic models for reforms but that significantly affect the individuals being asked to take part in them. Furthermore, even common challenges and motivations for focusing on student success played out differently based on the particularities of institutional environments. For example, while navigating highly centralized university system policies and procedures delayed the implementation of new technologies at Community College A, it was the decentralization of advising policies and procedure that proved to be a challenge for promoting use of new tools at University A. Moreover, while three of the four institutions faced similar financial challenges, neither community college experienced the same level of frustration and burnout among advisors that University B did due to a lack of communication from leadership and a top-down approach to implementing changes to advising structures and technology systems.

Evidence from this study suggests that colleges, entities that support advising redesign work, and funders may consider developing a logic model that extends beyond the traditional categories of resources, activities, mediators, and outcomes to consider the

[6] https://www.stradaeducation.org/measuring-the-value-of-education/key-themes-practices-emerge-in-re-imagining-first-year-of-college/

external, institutional, and interpersonal contexts and the complementing and competing forces that may be at work. Upon reflecting on the complex ecosystems observed in this study, we developed some guiding questions that practitioners and institutional partners could use when developing a logic model to support planning for and implementing advising redesigns.

In addition to highlighting the resources and activities that comprise the main components of technology-mediated advising redesign efforts, it is critical to consider how the larger environment affects both institutional and individual ability to utilize and implement those components. In the current study, taking a broad view of the factors affecting advisors' engagement with redesign efforts revealed a clear tension between individuals' beliefs about the kind of relationship-based support students need and their capacity to provide that level of support.

Additionally, by placing relationships between individuals at the center of institutional change, an ecological systems theory approach underscores the importance of including those most directly affected by reforms in planning and implementation. Future studies may benefit from a more intentional focus on faculty members, who in their roles as professors, advisors, and professional mentors are an essential part of advising redesign efforts and central to students' college experience. In addition, there is a need for a greater understanding of how students' lives outside of college may affect their ability and willingness to engage with advising.

Table 8
Guiding Questions for Institutions Considering Advising Redesign Work

External Environment	Institutional Environment	Interpersonal Environment	
		Faculty/Advisor	Student
National College Completion Organizations and Initiatives • Does our institution participate in any national organizations or initiatives related to student success? • How can our participation be leveraged to support advising redesign work? **State Policies Related to College Completion** • What are the major policies related to college completion in our state? How might they facilitate or hinder advising redesign work? • What future changes might we anticipate from the state that may affect advising? **State and Local Economic Conditions** • How can we leverage external resources to inform advising redesign? • What are the economic conditions in our state and local area that are affecting financing for advising work (e.g., unemployment rates, state higher education budgets, demographic trends)?	**Resource Constraints** • How does our institution's financial standing affect faculty and advisors (e.g., in terms of teaching load/caseload, availability of technology resources)? **Centralization of Advising Policies and Procedures** • How does our institutional structure (for advising and more broadly) facilitate or hinder advising redesign efforts? **Approach to Managing Institutional Change** • What advising technologies will align with our institution technically and culturally? • What student success initiatives and activities are underway at our institution? How will we connect advising work to those efforts? • Who should be involved in decision-making for this work? • How will we communicate about our advising redesign efforts? • Who will lead this work? What should their qualifications be? • How will training be facilitated and how often? • How have previous large-scale changes been received at the institution? Why?	**Advising Approach** • What are faculty and staff members' philosophies about advising and student support? • What are their current practices? What tools do they use? What do they find useful or cumbersome? **Advising Capacity** • What is the rate of turnover among advisors? • Do caseloads vary by discipline? What is a reasonable caseload? Are there perceived inequities in the distribution of work? • How much time will end users need to learn how to use new technology tools? **Reactions to Technology Adoption** • In what ways will advisors and faculty be asked to change their practices? How do those changes align with their existing advising approaches and capacity?	**Advising Needs and Experiences** • How do students describe their experiences with advising? • What common needs do students have at various points in their educational journey? • What type of support from advisors and faculty do students say they want or expect? **Access to Advising** • What may be happening in students' lives outside of college that affects their ability to engage with advisors and faculty? • How can we ensure students have access to advisors during peak advising times? **Advising Outcomes** • What qualitative (e.g., socioemotional benefits, satisfaction with advising) and quantitative (e.g., grades, retention, completion) student outcomes do we expect from advising redesign work?

6. Conclusion

Widespread interest in enhancing advising and student support as a strategy for increasing student success is leading more and more postsecondary institutions to redesign their advising services by leveraging technology to provide holistic support at scale. Using an adapted model of ecological systems theory, in this study, we took a close look at the dynamics affecting the implementation of advising redesigns at four institutions that participated in the iPASS grant initiative. Overall, we found that although colleges are engaging in and responding to a number of positive dynamics that are likely to promote successful implementation, there is also a need for greater consideration of the complex external and internal challenges that make redesigning advising a complex, time-intensive endeavor. It may be useful for funders as well as organizations providing technical assistance and support for colleges to adopt an ecological systems framework in planning for and engaging in ongoing monitoring and assessment of the work.

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Appendix A: Code List

Code	Definition
Advising	
Advising and student support structure	Statements related to institutional factors, understanding how advising and student support relate to the larger organizational structure
Advising philosophy	Discussions of advising philosophy (can be applied to non–end users too): 1 = Advising should be about getting students the information they need to make their own academic decisions. 2 = Advising should be about helping students understand their strengths and weaknesses and figure out what they want to do in life and how to do it. 3 = Advising should be about ensuring students are academically successful and on track to graduate. 4 = Multiple
Advising processes and procedures	Statements related to the delivery of advising services: processes for assigning students to advisors, average length of advising session, whether appointments are mandated, etc.
Approach—transactional	Statements by any type of participant indicating that advising interactions are focused on transactional activities, such as course registration
Approach—developmental	Statements by any type of participant indicating that advising interactions incorporate a developmental, advising-as-teaching perspective
Faculty role in student support	Descriptions of how faculty provide academic and nonacademic support for students
Last advising session	Advisors' accounts of their most recent meeting with a student
Student self-advising	Statements by any type of participant indicating that students are independently engaging in activities such as education planning, seeking out information about careers, etc.; applies to end user perspectives and beliefs only
College context/background	
College and university/system relationships	Statements related to the relationship between community college and university partners or the relationship to the state higher education system
Current technology/technology overview	Statements related to new or previously acquired technology
Counseling and coaching technology systems	Statements related to systems for facilitating case management (e.g., shared case notes)
Education planning systems	Statements related to interactive program/degree planning systems
Risk targeting systems	Statements related to early alerts, predictive analytics
Student population/subgroups	Descriptions of distinct student populations with unique needs or for whom targeted services are provided (e.g., dual enrollment students, first-generation students, Black males)

Code	Definition
iPASS adoption	
Accountability for use of iPASS tools	Statements related to the college's efforts to hold end users accountable for using iPASS tools
Communication to raise awareness about iPASS among intended users	Statements related to discussions of the college's effort to communicate iPASS implementation plans to end users
Inclusion in decision-making efforts	Statements related to the college's efforts to include end users in decision-making processes around iPASS (e.g., including end users on iPASS committees, soliciting feedback through surveys or interviews) or individuals' descriptions of how involved they have been in the iPASS planning process
Theory of change management	Statements related to either personal opinions about strategies for instituting change on campus or use of a formal theory or approach to guide change efforts
Trainings related to iPASS implementation	Statements related to trainings and professional developmental opportunities offered to staff
iPASS goals/rationale	Codes in this category capture discussions of the goals for iPASS and why the college decided to engage in iPASS work.
Improving student academic outcomes (e.g., student retention, graduation rates)	
Improving student services	
Improving technology	
Increasing interdepartmental communication	
Increasing student enrollment	
Availability of grant funds	
Meeting strategic planning/other institutional goals	
Redesigning advising	
Redesigning organizational infrastructure	
iPASS successes	Statements related to things that have gone well with iPASS implementation or positive results the college is experiencing as a result of iPASS implementation
Lessons learned about iPASS	Statements related to lessons the institution has learned about iPASS during implementation
Plans for assessing iPASS impact	
Measuring intermediate iPASS outcomes	Discussions of intermediate outcomes the college is collecting data on and how the college plans to measure intermediate student outcomes, rated on a 3-point scale in Dedoose: 1 = plan is vague, unclear or nonexistent 2 = developing plan for measuring outcomes; 3 = clear plan for measuring outcomes

Code	Definition
Measuring long-term iPASS outcomes	Discussions of long-term outcomes the college is collecting data on and how the college plans to measure long-term student outcomes, rated on a 3-point scale in Dedoose: 1 = plan is vague, unclear or nonexistent 2 = developing plan for measuring outcomes 3 = clear plan for measuring outcomes
Professional background/job function	Statements related to professional background, years of service, current role at the institution
Relationship to other student success initiatives	
Difficulty coordinating multiple initiatives	Statements related to overlap between initiatives, initiative fatigue
Difficulty isolating the impact of iPASS from other success initiatives	Discussions of whether colleges are able separate the impact of iPASS from that of other student success initiatives
External initiatives	Statements related to student success initiatives that are driven by external entities, such as ATD, CCA, the American Association of Community Colleges' guided pathways project
Internal initiatives	Statements related to other student success initiatives developed internally within the college, such as developmental education and transfer initiatives
Synergy between initiatives	Statements related to complementary goals, etc.
Timing of initiatives	Statements related to when initiatives were implemented
Roadblocks/challenges	
Challenges with funding	Discussions of the challenges of having limited financial resources to carry out intended iPASS implementation
Challenges with technology	Discussions of challenges the college experienced with implementing iPASS technologies that might have delayed iPASS implementation (e.g., technology not yet purchased or not meeting the college's need)
Communication challenges	This code is a catch-all for discussions about communication challenges.
Institutional bureaucracy	Discussions of challenges resulting from bureaucracy at the college (e.g., needing the college's or department's approval to undertake certain actions)
Lack of institutional capacity for iPASS implementation	Discussions of human resources challenges (e.g., staff have not been hired, too few staff to carry out implementation)
Lack of understanding of iPASS project	Indications that stakeholder is not informed about iPASS or that their understanding of the work is not aligned with the predominant goals for the work
Other challenges	Statements related to challenges that don't fit any of the specific categories
Resistance	Discussions of lack of buy-in from an individual end user or groups of users

Code	Definition
Student codes	Codes in this category are primarily for student interview transcripts but could apply when end users provide detailed descriptions of student interactions.
Description_academic challenges	
Description_academic successes	
Description_advising overall	This code applies to students' descriptions of the overall structure of advising as it applies to them (how they are assigned an advisor, who they see for various issues, how they schedule appointments).
Description_advising session/interaction	This code applies to students' descriptions of in-person or virtual interactions with advisors.
Description_ personal story/background	
Experiences_education/career planning	Student descriptions of how they plan for classes, transfer, etc.: 0 = alone 1 = with advisor 2 = with others (family, friend, etc.) 3 = multiple
Experiences_major selection	Student descriptions of how they selected their major: 0 = alone 1 = with advisor 2 = with others (family, friend, etc.) 3 = multiple
Experiences_other support	Student descriptions of academic or nonacademic support
Other support_family, friend	
Other support_on campus	
Experiences_technology	Student descriptions of use of college technology
Perceptions_advising	Students' perspectives on their advisor or faculty; double-code with negative or positive if applicable
Perceptions_advising overall	
Perceptions_overall support	
Perceptions_person most helpful	
Perceptions_satisfaction with advising	Students' responses to a specific question about their level of satisfaction with advising
Services students want	
Transformative change and iPASS	
Attitudinal changes	Statements related to changes in stakeholder attitudes toward iPASS or change
Changes that occurred prior to the iPASS grant	Statements related to changes the college had undergone prior to receiving the iPASS grant; always double-coded with a specific change code

Code	Definition
Leadership for change—iPASS champions	Statements related to the biggest supporters of iPASS
Changes in advising processes	Statements related to changes in how advising is done as a result of iPASS (e.g., developing learning outcomes for advising, using case notes, incorporating data in advising sessions)
Changes in institutional processes	Statements related to changes in the way things are done at the institution as a result of implementing iPASS
Changes to advising structure	Statements related to changes to the physical structure of advising center, the hiring of additional advisors, etc.
Changes to institutional policy, regulations, and protocols	Statements related to policy changes, such as instituting a mandatory advising appointment
Changes to job responsibilities	Statements related to changes to the advisor's job or responsibilities as a result of engaging in iPASS
Changes to other student support services (outside of academic advising)	Statements related to changes to other support services, such as tutoring and mental health counseling, and changes in the referral process between advising and these services

Appendix B: Code Map by Ecosystem Level

	Parent Code	Subcodes
External environment	College context/background	College and university/system relationship Student population/subgroup
	Relationship to other student success initiatives	External initiatives
Institutional environment	College context/background	College and university/system relationship
	iPASS goals	Meeting strategic planning/other institutional goals Redesigning organizational infrastructure Redesigning advising
	Relationship to other student success initiatives	External initiatives Internal initiatives Difficulty coordinating initiatives Synergy between initiatives
	Roadblocks/challenges	Challenges with funding Lack of institutional capacity Challenges with technology Institutional bureaucracy
	Transformative change	Structural changes Changes that occurred prior to iPASS
	iPASS adoption	Communication to raise awareness Inclusion in decision-making efforts Theory of change management
	iPASS goals	Increasing interdepartmental communication
	Roadblocks/challenges	Communication challenges Challenges with implementation rollout Resistance
	Transformative change	Leadership for change—iPASS champions
Interpersonal environment	Advising	Advising philosophy Approach_transactional Approach_developmental Faculty role in student support Last advising session
	Professional background/job function	
	Roadblocks/challenges	Lack of understanding of iPASS project
	Student codes	All (see list in Appendix A)

Appendix C: Institutional Ecosystems

Figure C1
Community College A

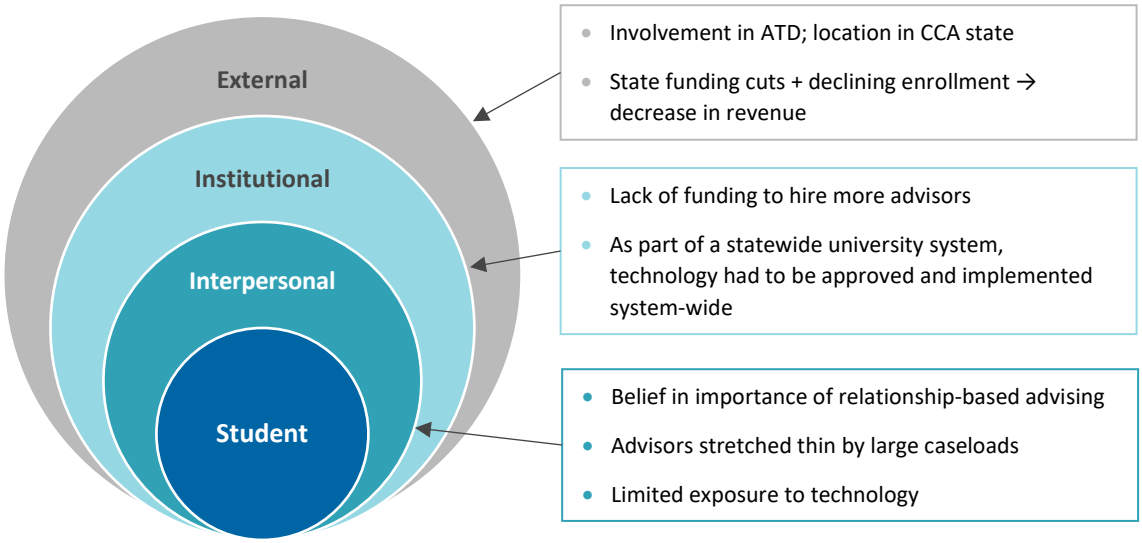

Figure C2
Community College B

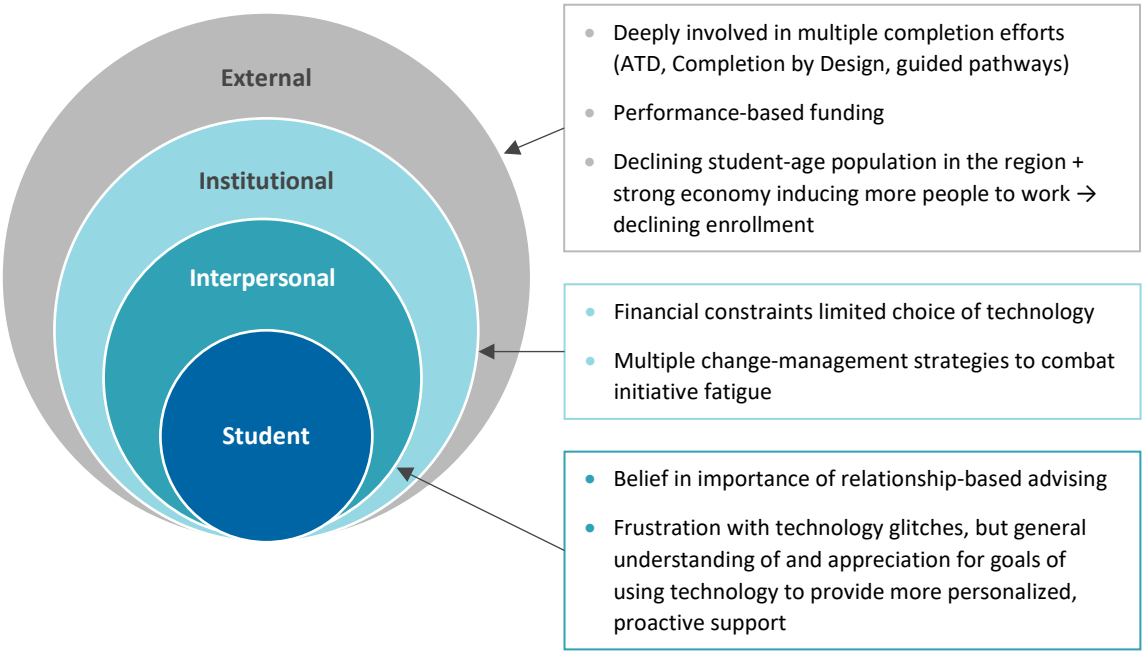

Figure C3
University A

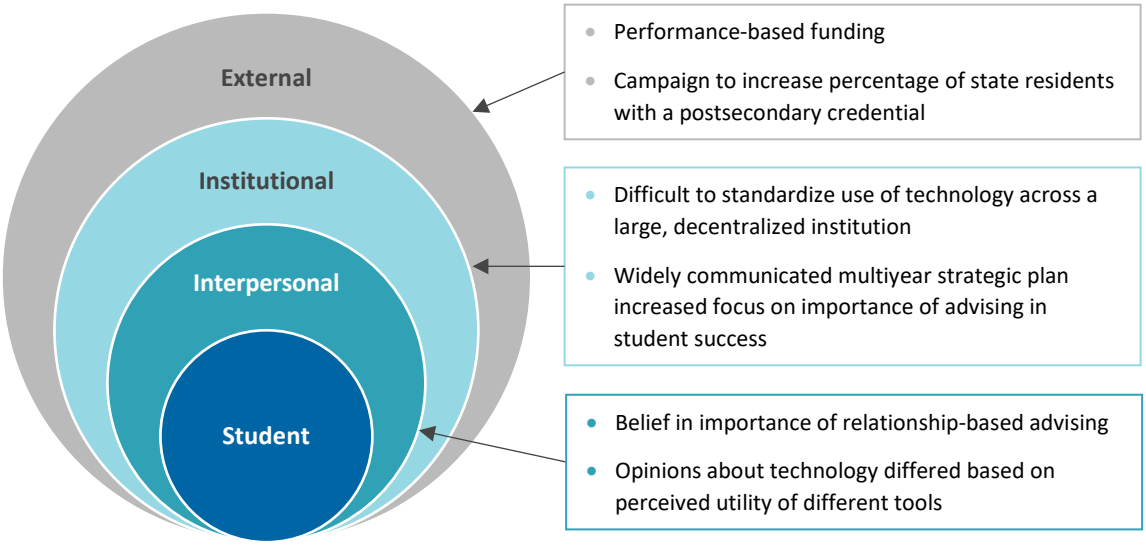

Figure C4
University B