The Strategic Use of Data in High-Performing Colleges

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With the dramatically increasing capabilities of information technology, the effective use of data has become critical in higher education. Nevertheless, extant literature on how top-performing institutions foster data-based decision making is limited. We examined how institutions with higher-than-predicted graduation rates use data in decision-making. Site visits were conducted with in-depth interviews and focus groups at 5 institutions with 172 participants. Recurrent themes included: 1) senior leadership's embrace of data, 2) emphasis on data relevance and its accessibility, and 3) strategic use of data. The findings may be helpful to policymakers and practitioners seeking effective ways to improve college graduation rates.

Keywords: higher education, data-based decision-making, leadership, college completion, retention, use of data

INTRODUCTION

Background

With the explosion of information technology and data availability in recent decades, the relevance and practicality of deploying greater data-based decision-making within institutions of higher education has never been higher. As previous education researchers have defined (Schildkamp et al., 2017), data-based decision making is meant to use information that is systematically and iteratively collected, analyzed, and reported to make sense of the educational experience. Relevant data can be quantitative, qualitative, or mixed, and can pertain to a variety of experiences, from student achievement to departmental performance to the institutional context in which education is delivered.

Despite the potential for data-based decision making to improve educational institutional performance (Campbell & Levin, 2009; Carlson et al., 2011; Poortman & Schildkamp, 2016; Ramaswami et al., 2023), challenges to its widespread adoption are many. Negative attitudes toward data have been documented (Jimerson, 2014); data skill-building can take time and resources (Poortman & Schildkamp, 2016; Adolfsson & Hakansson, 2023) professional development programs to enhance data-based decision making have mixed results (Gesel et al., 2023), and data accessibility—particularly relevant and timely data–can be limited (Wayman et al., 2013; Schildkamp et al., 2017). Regardless, with the acceleration of information technology approaches in education, researchers and practitioners are now experimenting with data mining, machine learning models, and learning analytics dashboards to increase student engagement, inclusive education, and student success (Ramaswami et al., 2023; Cardona et al., 2023; Adolfsson & Hakansson, 2023; Wilcox et al., 2021).

Although the literature in this area is burgeoning, the vast majority of studies focus on primary or secondary education (Kippers, Poortman, Schildkamp, & Visscher, 2017; Staman, Timmermans, & Visscher, 2017; Ebbeler, Poortman, Schildkamp, & Pieters, 2015; 2017, with few studies focused on the use of data-based decision making by institutions of higher education. Particularly limited are empirical investigations of institutional actions concerning data-based decision-making and its contribution to institutional performance. Accordingly, in this paper, we examine how the use of data by higher education institutions is linked to achieving higher-than-expected rates of college completion.

THEORETICAL FRAMEWORK

The relatively low college completion rates across the US are well-documented (Tesfamariam et al., 2023; NCES, 2020), with colleges and universities, on average, graduating only about half of their students who matriculate. We apply the framework of Tinto and Pusser (2006), which posits that institutional action, i.e., strategies and efforts that institutions take, can have a positive impact on student achievement and college completion. The framework thus calls for researchers to shift the level of analysis from the student to the institution. This shift in lens is fundamental to our objective of characterizing how institutions use data in organizational decision making, focusing on institutions that successfully achieve high graduation rates given existing resources.

We also drew on the theory of positive deviance (Marsh et al., 2004; Bradley et al., 2009) for this study. This theory argues that institutions vary in their levels of performance, and much can be learned from such variation. Examining top performing institutions can reveal endemic innovations and approaches–developed within the existing context and, therefore, practical to implement–that may be scaled to larger groups of institutions. This approach has been used in a range of settings, from reducing childhood malnutrition in Vietnam (Marsh et al., 2004) to increasing survival after heart attacks in the US (Bradley et al., 2009). Here, we use this method to generate new evidence concerning possible approaches to improving college graduation rates nationally.

Last, we have benefited from Schildkamp's framework (2019) pertaining to using data to improve educational organizations' performance. This framework begins with goal setting as a first step in impactful use of data. Three iterative activities, all related to the goals, ensue: data collection, sense-making, and action and evaluation. Data collection procedures are shaped to fit organizational goals; sense-making is the process of integrating data across sources to tell a compelling story or narrative about what is occurring relative to the goals, and action and evaluation focuses on the degree to which goals were achieved. These building blocks of data-based decision making helped shape our inquiry as described below.

METHODS

Study Design

This qualitative study used in-depth data from site visits and open-ended interviews to characterize recurrent themes relating to student college completion and the use of data across each institution studied. The sample of institutions selected by the research team was based on the positive deviance approach (Bradley et al., 2009; Marsh et al., 2004); the site visits were conducted from November 2023 through February 2024. Vassar College's Institutional Review Board reviewed and exempted all research procedures before conducting the study.

Sampling Strategy

We used IPEDS (Integrated Postsecondary Education Data System) completion data from Spring 2019 as a basis for our sampling strategy. Using 6-year completion data from a national sample of institutions conferring four-year baccalaureate degrees and reporting data to IPEDS (N = 2,165), we calculated the predicted graduation rate for each institution, using multivariable regression analysis adjusting for IPEDS variables previously found to predict institutional graduation rates (Tesfamariam et al., 2023). Variables included in the model were endowment per student, instructional expenses per student, percentage of faculty who are full-time, ownership type (for-profit, nonprofit, public), designation as a Historically Black College or University (HBCU), types of degrees offered (e.g., bachelors, masters, doctorate), geographic location (US Bureau of Economic Analysis region), and student demographic characteristics (Pell Grant recipient, race/ethnicity, and gender).

For all institutions with at least 1,000 four-year degree-seeking students (N=1,526), we compared the predicted graduation rate with the actual graduation rate using Spring 2019 completion data, which were the latest figures accessible at the time. Based on this analysis, we identified institutions with actual graduation rates that were at least two standard deviations above their predicted graduation rates, thus institutions that demonstrated "positive deviance," which were 29 institutions, as has been previously described (Eshetu et al., 2025). Among the 29 institutions, 11 were excluded from the sample as their actual graduation rates were less than 55%. Despite achieving substantially higher-than-predicted graduation rates, their graduation rates were not much higher than the national average of 51% in 2019 (Tesfamariam et al., 2023). An additional 6 institutions were excluded from the sample because they only offered specialized degrees in concentrations such as fashion, mining, or computer science–leaving 12 institutions eligible for inclusion in the study. For these 12, we examined previous three-year graduation rates (2016-2019) to substantiate that completion rates had remained relatively steady. We then selected institutions to ensure a diverse sample in terms of ownership type (for-profit, nonprofit, public), student enrollment, and regional location. We continued to sample until we reached theoretical saturation, i.e., until no new themes emerged with subsequent site visits. This occurred after we completed site visits at 5 institutions. All 5 institutions contacted for the study consented to participate, and 100% of our sample participated.

Data Collection

Site visits were conducted over 8 hours. They included a diverse research team of 3-5 members with varying levels of experience in qualitative research and experience in student affairs, higher education administration, and college diversity and inclusion initiatives. Each site identified the president or chancellor of the institution as well as administrators, program directors, and faculty most experienced in collegiate programming, pertinent for college graduation rates. This also included the vice president of academic affairs, and a set of students selected as diverse in experience. At each site, a range of 28-41 people were interviewed.

We conducted in-depth interviews with a semi-structured, open-ended discussion guide (see Appendix for discussion guides) using follow-up questions and prompts to elicit additional detail. We employed established approaches to enhance the validity of our findings (Curry et al., 2009; Patton, 2002). Interviews and focus groups averaged 36 minutes in duration, while some interviews reached an hour in duration. The interviews focused on participants' involvement in college activities, programming, and strategies to promote and sustain high graduation rates. Upon receiving verbal consent, interviews were audio-recorded and transcribed using Rev.com, a transcription software program. To ensure the integrity of participants' anonymity, all interviewees' names and affiliations with the institutions were pseudonymized in the analysis.

Data Analysis

We employed the constant comparative method of qualitative data analysis (Miles & Huberman, 1994; Strauss & Corbin, 1998; Glaser & Strauss, 1967) to develop a coding structure for the qualitative data collected, which included line-by-line review and coding of transcribed interview data. This step involved all members of the research team to ensure a diverse and comprehensive interpretation of the data. The thematic code structure was first developed inductively, involving two members of the research team coding each transcript independently and then jointly, as the code structure was augmented and refined with each successive review. Disagreements or variations in viewpoints were resolved through negotiated consensus until a final, agreed-upon coding structure was established as recommended by experts in qualitative analysis (Armstrong et al., 1997; Morse, 1994; Lincoln

& Guba, 1985). With the final coding structure, two researchers together re-coded each transcript, identifying and resolving disagreements through discussion. Throughout the process, we documented the development of the code structure, code definitions and principles we used in applying the codes, and memos regarding the meaning and relationships among the codes, forming the basis of an audit trail (Miles & Huberman, 1994) to enhance reproducibility. The software ATLAS.ti (version 24.2.0.32043) was used to organize and retrieve coded data for qualitative analysis. For this study, we focused on participants' utterances and descriptions that were coded as "use of data," a domain that included 10 subcodes that characterized three recurrent themes.

RESULTS

Description of the Sample

A total of 172 key informants at 5 institutions were interviewed. These participants included faculty (23%), administrators (44%), and students (32%) (See Table 1). The higher education institutions were geographically diverse (located in the Northeast, Midwest, Southeast, West, and Mid-Atlantic regions) and reflected a range of ownership types (3 institutions were public, 1 was private, for-profit, and 1 was religiously affiliated); together they had an average acceptance rate of 72%, and the size of the undergraduate student body ranged from 1,600 to more than 8,300 (See Table 2). These interviewed participants included faculty (24%), administrators (42%), and students (32%) (See Table 3).

TABLE 1
DEMOGRAPHICS OF STUDY PARTICIPANTS

Characteristics	N	%
Gender		
Female	88	51%
Male	82	48%
Other	2	1%
Race/ethnicity		
Asian American	5	3%
Black / African American	21	12%
Hispanic / Latinx	40	23%
Two or More Races	7	4%
White	97	56%
Unspecified	2	1%
First generation		
Yes	76	44%
No	94	55%
Unspecified	2	1%
Role		
Administrator	72	42%
Faculty	42	24%
Student	55	32%
Unspecified	3	2%
Total	172	100%

TABLE 2
PARTICIPATING INSTITUTION CHARACTERISTICS

Institution	Enrollment Size	U.S. Region	Ownership Type	Years in Existence	Instruction Expenses Per Student FTE (2019)	Endowment Assets Per Student FTE (2019)	Actual Grad. Rate (2019)	Predicted Grad. Rate
Institution 1	3,749	Northeast	Public	116	$11,237.00	$1,645.00	60	38.11
Institution 2	7,073	Northeast	Public	169	$12,556.00	$5,709.00	86	64.69
Institution 3	2,359	Southeast	Private, For-profit	36	$2,487.00	$0.00	57	25.92
Institution 4	1,631	Midwest	Private, Non-profit	56	$7,039.00	$12,576.00	68	46.65
Institution 5	8,372	West	Public	19	$9,985.00	$1,602.00	69	48.92

Note. Table 2 shows Fall 2023 enrollment data for all undergraduate students: reported by IPEDS.

TABLE 3
PARTICIPANTS BY INSTITUTIONAL POSITION

Position	Institution 1	Institution 2	Institution 3	Institution 4	Institution 5	Total
Faculty	10	5	13	9	5	42
Administrator	14	14	14	16	14	72
Student	16	9	12	9	9	55
Unspecified	1		2			3
Total	41	28	41	34	28	172

Institutions were below the national average in their financial resources (Tesfamariam et al., 2023), with average endowments of $4,300 per student and average instructional expenditures of $8,660 per student. On average, about three-quarters of their faculty were full-time. From the qualitative data analysis, three recurrent themes emerged, and we report illustrative, verbatim quotations that illustrated each theme.

Theme #1: Senior Leadership Engagement With Data

Across the institutions, participants described the deep engagement of their president, chancellor, and senior leadership teams in identifying problems with and improving graduation rates by means of collecting and analyzing data. This involvement included creating workflows for data collection, analysis, and reporting; understanding the data personally and being present in staff meetings when data reports were being reviewed; and setting expectations that elevating completion rates was an integral part of everyone's job. A Director of Institutional Research at Institution #1 illustrated this point as follows:

> Our new president is super hands-on in retention, loves data. And he charged a new committee…and increased the size of the committee and made sure that all divisions of the college were being represented. And the provost was very involved, the president, the deans–the three deans are very actively involved and do provide leadership. One of the reports that I create every year is academic program level trends, And the deans are very engaged in those data, and they read those reports. And if they're identifying a downward trend in academic programs, they'll talk to the department chair. (Director of Institutional Research, Institution #1)

At Institution #4, a similar sentiment was expressed, again demonstrating leadership commitment to the use of data and its influence on people's expectations about their work. In this institution, a senior administrator described how the institutional leadership set the tone and expectations regarding data and student retention:

> I serve on the Retention Council, and we help support the [leadership] with the data that they need…The Associate Vice President has done a really good job of emphasizing that retention is everybody's job. It takes all of us to ensure that we have good retention on campus. (Dean, Institution #4)

In addition to setting expectations for the use of data, senior leadership also aligned structures to facilitate data-oriented decision making. This included establishing dashboards to unify how key performance metrics (including retention rates) were tracked across departments and functions, supporting benchmark efforts with peer institutions, and investing in digitalization, analysis, and reporting resources (both staffing and data systems) to ensure timely and reliable data concerning student progress through their college career. For instance, one administrator said:

> The president brought with him from a previous institution a tracking form that allows us to clearly identify, based on the risk indicator, what students should be prioritized over the summer. We transferred that into an automated system so that we have a risk indicator on a daily basis. It's adaptive based on their contacts and interactions on campus and their academic progress so that we know the most at-risk students, and we have interventions that are used for each [risk] group. (Administrator, Institution #1)

And a president with decades of experience described the following practice of using data:

> We've always tracked data…We track our graduation rate, obviously. We're constantly monitoring the default rate, the graduation rate, and everything else. (President, #3)

Theme #2: Data Accessibility and Relevance

Participants across institutions related experiences that underscored the accessibility and relevance of their data on student retention. Reviewing such data was described as part of regular routines at work rather than as a special project. For instance, an administrator related:

> We have this monthly meeting of the provost, department chairs, and directors within academic affairs. And that is a regularly scheduled meeting every single month where retention and graduation issues come up and are discussed. And so, there's this ongoing discussion within academic affairs of situations affecting retention and efforts, communicating efforts of strategies to address retention and graduation concerns and getting folks engaged. (Director of Institutional Research, Institution #1)

The timeliness of the data was also highlighted. Data was collected not only regularly but also early in the students' time at the colleges. One administrator explained it this way:

> We have something called the Pulse Survey which is a survey that goes out early in the semester [and] literally helps us to take the pulse of the campus and particularly our first-year students to say, how are you doing? And then based on that, we're able to perhaps implement intervention methods if we're seeing a trend in that data... (Vice President for Academic Affairs, Institution #4)

Participants also noted the relevance of the data they received, as it was specific to subgroups and included comparisons with national trends. This is how one participant described the relevance of the data their institution made available regularly:

> [We] look at national trends, look at the landscape out there, and then kind of use that [data] to start doing deep dives into our data. Nationally, we're noticing a downward trend in this particular population. Well, what's going on at our campus? [We] delve into the data that way, but I guess look at your data, look at certain populations, look at trends, and then if something jumps out at you, communicate that. So, I report to the provost, and anytime I see a trend or a data point that's just not looking good, I communicate it. (Director of Institutional Research, Institution #1)

Such data reports led to a shift in focus from merely increasing the size of the incoming student population to implementing a more evidence-based approach to student retention. This approach allowed institutions to track changes over time across different segments of the student body and compare outcomes with peer institutions and national trends. One institution described tracking retention by faculty and providing professionals development and assignment changes as needed:

> We do look for patterns and behaviors with faculty. We work on all of them, but I'm targeting the [ones with the lowest retention] to coach and give them professional development and maybe give them different courses. If I'm teaching algebra four sections of algebra every term eight times a year, I could get easily sick of that as a teacher. Sometimes we give them course relief, work on revamping a course, do curriculum development, and do those types of things that energizes them differently. (Vice President, Academic Affairs, Institution #3)

Last, participants reported that their institutions used a variety of data–both qualitative and quantitative–to understand challenges related to retention rates. Particularly with the engagement of faculty, more robust narratives about the student experiences and inclusion of investments in academic resources to retain students were compelling, as a provost described:

What the faculty were looking for was a deeper intellectual climate and environment on our campus and [they] knew that our students wanted that and had the capacity to do that, and administratively we said, absolutely, this is fantastic. It's got to work economically. So, we modeled it out; there was quantitative and qualitative data that drove multiple pieces of that transformation [elevating the academic richness of the student experience], and that continues to drive how we look at the efficacy of a particular aspect of our curriculum. (Provost, Institution #2)

Theme #3: Using Data Strategically

Across the institutions, participants described experiences of using data to facilitate strategic problem solving–that is, data helped to establish a sense of urgency, galvanize cross-disciplinary and cross-functional teams and committees, and motivate focused work–including new investments needed to improve or sustain graduation rates. As an example, one assistant provost reflected on how the institution tackled declining completion rates in general and subsequently among the subset of Black students:

…[We] started to look at the needs of our Black students. And one of the things that came out is they wanted more culturally responsive, more targeted support. And so out of that came a funding line for us to hire this coordinator. They're [using] high impact practices, so they're kind of breaking down some of those barriers in a culturally responsive way. (Assistant Vice Provost for Undergraduate Education, Institution #5)

As an associate dean explained, data was used to create a sense of urgency around declining graduation rates, which led to specific actions that subsequently addressed the problem effectively:

We saw our retention drop, and we took some very specific actions through the grant to try and improve our retention rate. We sent five people to a retention conference on how to build a retention program. And so, we spent a whole spring semester–we did a focus group with students, we did research, and we came up with a list of recommendations as to what we could do as a campus to improve student retention rates. And we gave the presentation to [the president] ... And he's really taken a lot of [our] recommendations and put them into practice. (Associate Dean, Institution #1)

Although data were frequently employed for problem solving and evaluating intervention success, institutions carefully managed the complex and iterative data collection processes. They aimed to minimize survey fatigue and avoid dashboard overload. Participants emphasized the most important and practical aspects of collected data, reported in the most parsimonious way possible. As one administrator said, they worked to avoid "user fatigue."

We use the survey-based institutional assessment. We do that every two or three years. We usually buy the whole suite of surveys, trying not to fatigue the students with too many surveys. (Assistant Vice President of Student Affairs, Institution #1)

DISCUSSION

In this study of top-performing colleges and universities, we found 3 recurrent themes that demonstrated how institutions employed data-based decision-making. The themes included: senior leadership commitment to using data in decision making, ensuring that data and reporting were not overwhelming, but rather practical and easily accessible, and embracing data as a strategic tool. Participants shared examples of how they used data to identify institutional vulnerabilities, to get the "pulse" of the community, to galvanize teams across departments and hierarchies for proactively addressing problems, and to evaluate the effectiveness of various interventions in improving graduation rates. Participants described nuanced and savvy use of data for problem solving–such as

using data to map the next steps during critical setbacks while mindfully avoiding data overload that could result in data fatigue.

Our findings underscore the prominence of certain institutional actions–here, the effective use of data at all institution levels–in top-performing institutions. The consistent and targeted use of data among colleges and universities with significantly higher-than-expected graduation rates illustrates the importance of Tinto and Pusser's (2006) theoretical framework, which posits that institutional action and strategies–not just student characteristics–are integral to college completion. Furthermore, our findings are consistent with seminal work by Schildkamp and colleagues (Schildkamp et al., 2017; Schildkamp, 2019), which underscores the centrality of data-based decision making in education: for goal setting, for sensemaking, and for evaluation. Insights from this study also resonate with a recent literature review concerning data analytics in higher education, which highlighted the importance of leadership in institutional adoption of effective data analytics (Robershaw et al., 2024). Our work expands upon the existing literature by providing the practical approaches successful institutions use to achieve their high graduation rates and potentially inspire others to adopt such data-based decision-making approaches.

Implications for our results are several. Because our analysis identified common strategies used by institutions that varied by geography, size, and ownership type, the findings may be useful to a broad range of colleges and universities seeking to improve graduation rates. Additionally, these approaches were implemented in institutions with limited financial resources and were relatively inexpensive–not requiring massive financial investment but instead made possible by a shift in emphasis, enhanced data literacy, and leadership attention. Policymakers may also benefit from insights into the core approaches to data that top performing institutions use, particularly recognizing that strategic and parsimonious approaches to data are paramount to avoid data fatigue and less effective efforts. Last, the findings have implications for researchers, as this work may be followed by larger, quantitative studies that test the statistical significance of data-based decision making and practices with college completion rates.

Our findings should be interpreted in light of some limitations. First, our qualitative study was designed to generate rich data from which to extract recurrent themes rather than statistically testing hypotheses. Nevertheless, we applied methodological approaches recommended by experts in qualitative methods to enhance trustworthiness (Patton, 2002; Curry et al., 2009; Glaser & Strauss, 1967; Miles & Huberman, 1994), including consistent use of a discussion guide, having professional and independent transcription with accuracy checks for all interviews, and retaining an audit trail to document analytic decisions. Second, we examined a number of institutions that met the criteria for the positive deviance study; results may differ in other settings. Last, participant data may have been influenced by social desirability bias in which they may have misrepresented their experiences to mask unflattering information. To address this, we ensured that participants understood their names and institutions would remain confidential and anonymous; furthermore, because we were onsite, we checked for disconfirming data from multiple sources and participants to foster a more complete and valid understanding of the institutions and their activity.

This study of a selected set of high-performing institutions suggests important hypotheses about how the use of data may be linked to higher graduation rates. Further research might extend this work in two important ways. First, following institutions longitudinally to understand if changing approaches to data-based decision-making would be linked to changes in graduation rates could provide additional insights about the time to effect and the durability of efforts to sustain high performance. Second, studies of larger samples of institutions and quantitative measures of data-based decision-making could enable statistical testing of hypotheses raised in the present study and generate inferences about how such interventions may improve subsequent graduation rates.

CONCLUSION

In summary, we found that leadership strongly endorsed the use of data-based decision making in these colleges and universities across the United States that had achieved higher-than-expected graduation rates. Relevant and timely data were accessible and included in decision making at all levels. These data were used strategically–to identify problems, jumpstart teams to address the problems, and evaluate improvements. None of this was described as expensive or requiring major financial investments. Rather, the approaches the institution's data literacy relied on were a part of their institutional norms and integrated into daily routines and decision-

making. To the degree colleges and universities wish to improve their graduation rates, these findings may provide impetus to expand and deepen data-based decision-making for educational improvements.

REFERENCES

Adolfsson, C., & Hakansson, J. (2023). Data analysis for school improvement within coupled local school systems: Which data and with what purposes? *Leadership and Policy in Schools*, *22*(3), 714–727.

Armstrong, D., Gosling, A., Weinman, J., & Marteau, T. (1997). The Place of Inter-Rater Reliability in Qualitative Research: An Empirical Study. *Sociology*, *31*(3), 597–606.

Bradley, E.H., Curry, L.A., Ramanadhan, S., Rowe, L., Nembhard, I.M., & Krumholz, H.M. (2009). Research in action: Using positive deviance to improve quality of healthcare. *Implementation Science*, *4*, 25.

Campbell, C., & Levin, B. (2009). Using data to support educational improvement. *Educational Assessment, Evaluation, and Accountability*, *21*, 47–65.

Cardona, T., Cudnet, E., Hoeri, R., & Snyder, J. (2023). Data mining and machine learning retention models in higher education. *Journal of College Student Retention: Research, Theory & Practice*, *25*(1), 51–75.

Carlson, D., Borman, D., & Robinson, M. (2011). A multistate district-level cluster randomized trial of the impact of data-driven reform on reading and mathematics achievement. *Educational Evaluation and Policy Analysis*, *33*, 378–398.

Curry, L.A., Nembhard, I.M., & Bradley, E.H. (2009). Qualitative and mixed methods provide unique contributions to outcomes research. *Circulation*, *119*(10), 1442–1452.

Ebbeler, J., Poortman, C.L., Schildkamp, K., & Pieters, J.M. (2015). Effects of a data use intervention on educators' use of knowledge and skills. *Studies in Educational Evaluation*, *48*, 19–31. https://doi.org/10.1016/j.stueduc.2015.11.002

Ebbeler, J., Poortman, C.L., Schildkamp, K., & Pieters, J.M. (2017). The effects of a data use intervention on educators' satisfaction and data literacy. *Educational Assessment, Evaluation, and Accountability*, *29*(1), 83–105.

Eshetu, M., Bjork, C., Maragh Taylor, W., Quock, M., & Bradley, E.H. (2025). "Woven In": Mental Health and College Graduation Rates. *Journal of College Student Retention: Research, Theory & Practice*, *0*(0), 1–21.

Gesel, S.A., LeJeune, L.M., Chow, J.C., Sinclair, A.C., & Lemons, C.J. (2021). A Meta-Analysis of the Impact of Professional Development on Teachers' Knowledge, Skill, and Self-Efficacy in Data-Based Decision-Making. *Journal of Learning Disabilities*, *54*(4), 269–283. https://doi.org/10.1177/0022219420970196

Glaser, B., & Strauss, A. (1967). *The Discovery of Grounded Theory: Strategies for Qualitative Research*. Aldine Publishing Company.

Jimerson, J.B. (2014). Thinking about data: Exploring the development of mental models for "data use" among teachers and school leaders. *Studies in Educational Evaluation*, *42*, 5–14. https://doi.org/10.1016/j.stueduc.2013.10.010

Kippers, W.B., Poortman, C.L., Schildkamp, K., & Visscher, A.J. (2017). Data literacy: What do educators learn and struggle with during a data use intervention? *Studies in Educational Evaluation*, *56*, 21–31. https://doi.org/10.1016/j.stueduc.2017.11.001

Lincoln, Y., & Guba, E.G. (1985). *Naturalistic Inquiry*. Sage Publications.

Marsh, D.R., Schroeder, D.G., Dearden, K.A., Sternin, J., & Sternin, M. (2004). The power of positive deviance. *BMJ (Clinical research ed.)*, *329*(7475), 1177–1179.

Miles, M.B., Huberman, A.M., & Saldana, J. (2014). *Qualitative data analysis: A methods sourcebook* (3rd ed.). Sage.

Morse, J.M. (1994). Designing funded qualitative research. In N.K. Denzin & Y.S. Lincoln (Eds.), *Handbook of qualitative research* (pp. 220–235). Sage Publications.

National Center for Education Statistics. (2020). Undergraduate graduation rates. *NCES Fast Facts.*

Patton, M.Q. (2002). *Qualitative research and evaluation methods* (3rd ed.)*.* Sage.

Park, V., Dale, A., & Guerra, A.W. (2012). Strategic framing: How leaders craft the meaning of data use for equity and learning. *Educational Policy*, *27*(4), 645–675.

Poortman, C., & Schildkamp, K. (2016). Solving student achievement problems with data use intervention for teachers. *Teaching and Teacher Education*, *60*, 425–433.

Ramaswami, G., Susnjak, T., & Mathrani, A. (2023). Effectiveness of a learning analytics dashboard for increasing student engagement levels. *Journal of Learning Analytics*, *10*(3), 115–134.

Robershaw, K.L., Xiao, M., & Wolf, B.G. (2024). Research Analytics in Higher Education: Systematic Literature Review, Synthesis, and Conceptual Framework. *Research Management Review*, *27*(2).

Schildkamp, K. (2019). Data-based decision-making for school improvement: Research insights and gaps. *Educational Research*, *61*(3), 257–273.

Schildkamp, K., Poortman, C., Luyten, H., & Ebbeler, J. (2017). Factors promoting and hindering data-based decision making in schools. *School Effectiveness and School Improvement*, *28*(2), 242–258.

Staman, L., Timmermans, A.C., & Visscher, A.J. (2017). Effects of a data-based decision-making intervention on student achievement. *Studies in Educational Evaluation*, *55*, 58–67. https://doi.org/10.1016/j.stueduc.2017.07.002

Strauss, A., & Corbin, J. (1998). *Basics of qualitative research: Techniques and procedures for developing grounded theory* (2nd ed.). Sage Publications.

Tesfamariam, B., Alamo-Pastrana, C., & Bradley, E.H. (2023). Four-Year College Completion Rates: What Accounts for the Variation? *Journal of Education*, *0*(0), 1–9.

Tinto, V., & Pusser, B. (2006). Moving From Theory to Action: Building a Model of Institutional Action for Student Success. *National Postsecondary Education Cooperative*, *1*(15), 89–125.

Wayman, J.C., Jimerson, J.B., & Cho, V. (2012). Organizational considerations in establishing the Data Informed District. *School Effectiveness and School Improvement*, *23*(2), 159–178. https://doi.org/10.1080/09243453.2011.652124

Wilcox, G., Fernandez Conde, C., & Kowbel, A. (2021). Using Evidence-Based Practice and Data-Based Decision Making in Inclusive Education. *Education Sciences*, *11*(3), 129. https://doi.org/10.3390/educsci11030129

APPENDIX 1: EMPLOYEE DISCUSSION GUIDE

The following discussion guide was used for employees during interviews to facilitate qualitative data collection in relation to college completion at their institution.

1. Would you tell us your title, how long you have worked here, maybe a bit about your background, and then how your role has been involved with college completion rates?
2. How would you describe the organizational culture here? What have you or your team done to influence the culture? Have things in this area changed over time? How so?
3. What strategies or programs have you used/been part of here to influence college completion rates?

4. Can you tell me about some successes in this work? What about failures or setbacks?
5. Given we are here to learn about your experience with college completion rates, is there anything else we should have asked you? Anything else you want to share?

APPENDIX 2: STUDENT DISCUSSION GUIDE

The following discussion guide was used for students during interviews to facilitate qualitative data collection in relation to college completion at their institution.

1. Please share with us your class year, major, and what influenced your decision to attend this college.
2. Tell me about your campus; what is it like being a student here?
3. What are you involved in, including on campus or off campus activities?
4. Can you tell us about your relationships with faculty and faculty advisors? How have these people affected your desire to continue to graduation?
5. Have you ever had any really difficult times while here in college, even maybe times when you thought about leaving college, and can you tell me about that time?
6. Given we are here to learn about what helps students stay in college all the way to completing the degree, what else should we have asked you? Anything else you want to share?