The AIR Professional File

Spring 2026 Volume

Supporting quality data and decisions for higher education.

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PREFACE

This volume of *The AIR Professional File* features three articles that address distinct but important dimensions of institutional research practice. Two share a methodological emphasis: both illustrate how analytic choices shape findings and influence interpretation. The third article turns attention to the experiences and perspectives of professionals in the area of institutional research and effectiveness.

In *Predicting Student Success in Higher Education: A Data-Informed Analysis of Key Institutional Variables*, the authors examine factors that most strongly predict academic success. Using semester-level course completion data from a Midwestern associate degree–granting institution, they apply both decision tree models and logistic regression to the same dataset. The study shows that these two approaches address different but complementary questions about student success. Logistic regression identifies variables that are consistently associated with outcomes across the overall student population, providing a population-level view of risk. In contrast, decision tree methods reveal how risk varies across subgroups and combinations of characteristics, capturing interaction effects and patterns that are not always visible in regression models. Differences in results between the two methods underscore the importance of aligning methodological choices with specific analytic goals and research questions.

In *Understanding Ranking Volatility: How Methodology Inflates Apparent Change in U.S. News & World Report's National Universities Rankings*, the author makes an important contribution by shifting attention from debates over ranking indicators themselves to ranking methodology. The article demonstrates that observed movement in rankings depends on how ties and positions are handled within ranking systems. Specifically, it contrasts two common approaches: standard competition ranking, in which tied entities receive the same rank and subsequent positions are skipped (e.g., 1, 2, 3, 4, 4, 6), and dense ranking, in which tied entities share a rank but the next rank proceeds sequentially without gaps (e.g., 1, 2, 3, 4, 4, 5). These technical decisions produce different impressions of institutional movement even when underlying performance is unchanged. By unpacking how rankings are constructed, the study provides institutional researchers and higher education leaders with a clearer framework for interpreting volatility and communicating ranking changes to stakeholders.

In Strengths, Weaknesses, Opportunities, and Threats of Institutional Research, the authors address a different but equally important area of practice: understanding the professional environment in which institutional research work occurs. Drawing on responses from *The Node for IR/IE*, the authors analyze how practitioners describe the strengths, weaknesses, opportunities, and threats facing their offices. Respondents highlight talented and collaborative staff, expanding strategic roles, and adaptability, while also noting concerns about limited resources, staffing pressures, burnout, and increasing stakeholder demands. These findings offer a resource for institutional leadership when advocating for the involvement of IR/IE in institutional decision-making, resource allocation, and the broader recognition of the IR/IE function in postsecondary education.

Taken together, the articles in this volume reflect the breadth of the institutional research profession, from methodological rigor in analytics, to careful interpretation of externally constructed metrics, to the organizational realities that shape daily practice. I hope readers find each contribution both practically useful and professionally relevant.

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ISSN 2155-7535

Table of Contents

05 **Predicting Student Success in Higher Education: A Data-Informed Analysis of Key Institutional Variables**

Article 182

Authors: Prabesh Shrestha and Xiaowei Xu

25 **Understanding Ranking Volatility: How Methodology Inflates Apparent Change in U.S. News & World Report's National Universities Rankings**

Article 183

Authors: Don Rudawsky

39 **Strengths, Weaknesses, Opportunities, and Threats of Institutional Research: Reflections from Professionals in Institutional Research and Institutional Effectiveness**

Article 184

Authors: Katherine Gipalo, Samantha Nix, Eric Godin, Eric Atchison, and Ciera Merritt

73 **About the *AIR Professional File***

73 **About AIR**

Predicting Student Success in Higher Education: A Data-Informed Analysis of Key Institutional Variables

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Abstract

Higher education institutions increasingly rely on data-informed strategies to support student success, yet identifying the most impactful variables remains a challenge. This study integrates insights from existing literature with institutional data from a Midwestern, profession-focused associate degree–granting higher education institution to evaluate predictors of academic success, defined as the successful completion of all registered courses in a semester. Using Random Forest and generalized regression models, the analysis reveals that academic standing, early alert indicators (flags), and positive reinforcement (kudos) are the most consistent and significant predictors of student success. Financial aid and advisor contact show moderate, context-dependent effects, while demographic and enrollment characteristics, such as gender, age, and first-generation status, exhibit limited predictive power. These findings underscore the importance of proactive academic support, timely interventions, and recognition systems. Institutions can enhance student success by prioritizing early alerts, targeted advising, and financial support for their students.

Keywords: student success, predictive modeling, Random Forest, generalized regression, early alert indicators, academic interventions, institutional engagement, data-informed decision-making

The AIR Professional File, Spring 2026

Article 182

https://doi.org/10.34315/apf1822026

INTRODUCTION

Higher education institutions are committed to fostering student success, the definition of which varies widely based on individual goals, ranging from simply earning a degree to improving career prospects, expanding networks, or gaining a deeper understanding of the world. To meet these diverse aspirations, institutions must identify and implement effective services and support tailored to their unique student populations. Simultaneously, they must comply with standards set by accrediting bodies and government agencies, which evaluate institutional performance through metrics such as enrollment, course completion, graduation rates, loan default rates, retention, licensure pass rates, employment outcomes, and transfer rates (Denton & Hatfield, 2023).

Given this context, understanding the specific indicators of student success is essential for designing effective interventions. Many institutions have invested in early alert systems and basic needs support to address both academic and nonacademic challenges. However, assessing the impact of these initiatives requires rigorous analysis of their influence on student outcomes. Since institutions collect vast amounts of structured and unstructured data, the challenge lies in identifying which data points most effectively inform strategies for student support, while recognizing that no single variable universally predicts success across all student groups.

This study reviewed existing literature to address inconsistencies in how institutions define student success and identify the variables most associated with it. By examining prevailing definitions of student success, evaluating frequently used variables, and assessing their potential contributions, this study aimed to determine how these constructs can be used effectively to measure and improve student outcomes. The study focused on the following three questions: (1) Which variables most strongly predict semester-level course completion? (2) How do predictor effects vary across semesters? and (3) Do early alerts (flags, kudos, advisor contact) provide predictive value beyond demographics and financial support?

LITERATURE REVIEW

Based on the HLC conference (Denton & Hatfield, 2023), for any institution a strategic approach to student success is to have a mission, understand the student population the mission serves, then align initiatives to support the students, analyze institutional infrastructure, and engage the college community.

Students' demographic data, socioeconomic status, first-generation status, and a few other data points could be helpful to understand and see the changes in student population within the institution. Getting to know students through a survey as they start their higher education can help capture their goals and their reason for choosing a specific institution, as well as to understand what they need to be successful.

An institution can review its initiatives to understand how it is providing support to the students and if those supports and services encompass all its students. Evaluating its policies and practices will help identify the impediments and challenges its students may be facing to succeed. The institution can then identify the area(s) in the institution that is (are) committed to student success, and ensuring that the students agree.

How does an institution start this process? To measure the effectiveness of initiatives on student success, it is important to define student success, identify the metrics used, and measure the effectiveness of the metrics on student success.

This literature review focuses on understanding what student success is and which variables were used to measure student success, then reviews the effectiveness of those variables.

Defining Student Success

Student success has been conceptualized across multiple dimensions, encompassing academic achievement, critical thinking, and social-emotional well-being. Van der Zanden et al. (2018) emphasized these domains, exploring predictors, similarities, differences, and interconnections. Academic achievement is typically measured through GPA, credits earned, and persistence, as noted by Van Rooij et al. (2017), whereas Webb et al. (2020) highlighted the impact of grading scales on fail rates, cautioning against percentage-based systems. In community-college contexts, success has been operationalized as persistence, attainment, and transfer, with Calcagno et al. (2018) and Hensley et al. (2021) linking higher grades and persistence to positive outcomes. McLeod (2019) and Thalluri (2016) identified the critical first semester as pivotal for retention and timely completion, while Gardner and Brooks (2018) emphasized dropout, stop-out, grades, and graduation in the MOOC (massive open online course) context.

Beyond academic metrics, student success is increasingly framed as individualized and socially situated. Lydster et al. (2019) argued that higher education functions as a bridge to professional goals, making success a personal construct. Picton et al. (2018) found that students initially associate success with time management and external feedback; over time, however, behavioral engagement and emotional factors such as belonging and self-efficacy become central. Critically, Weatherton et al. (2021) highlighted systemic inequities in STEM, critiquing narrowly defined institutional measures and advocating for inclusive, nonacademic indicators informed by student perspectives, community-based research, and policy reforms.

Variables Used to Measure Student Success

Variables used to measure students' success span academic, relational, and sociocultural domains. Academic metrics include GPA, course grades, credits, and gateway course completion (Belfield et al., 2018; Chamely-Wiik et al., 2023; Rosser-Majors et al., 2022). Relational and environmental factors such as parental involvement, mentorship, and cultural support programs influence outcomes (Bell et al., 2023; Kranstuber et al., 2012; Lydster & Murray, 2019). Sociocultural adjustment and psychosocial well-being are increasingly recognized as critical for persistence, with interventions including counseling, pre-orientation programs, and first-year experience courses supporting student adaptation (Brunsting et al., 2018; Thalluri, 2016). Meta-analytic evidence suggests that high school GPA, academic motivation, study skills, prior preparation, social support, and program participation strongly predict academic achievement, while inquiry-based learning, challenging pedagogy, and first-year engagement predict critical thinking. Social-emotional well-being is influenced by coping self-efficacy, a sense of belonging, and social relationships, though demographic effects are inconsistent, with first-generation students often at a disadvantage (Van der Zanden et al., 2018). Collectively, these findings underscore the multidimensional nature of student success and the need for integrative, context-sensitive measures.

Table 1. Summary of Variables Derived from the Literature Review, Categorized with References

Variable Category	Variables	Reference(s)
Academic Performance	• Completion of gatekeeper courses in the first year • First-semester GPA • Cumulative GPA • Degree GPA	Belfield et al. (2018) Van der Zanden et al. (2018) Chamely-Wiik et al. (2023)
Time to Completion	• Time to graduate	Chamely-Wiik et al. (2023)
Postgraduation Outcomes	• Postgraduation experience (graduate/professional, undergraduate/certificate/none)	Chamely-Wiik et al. (2023)
Demographics & Background	• Gender • Race/ethnicity • Socioeconomic status • Parental education/income • First-generation status	Calcagno et al. (2008) Van der Zanden et al. (2018) Hensley et al. (2021)
Academic Preparation	• High school GPA • Advanced placement credits • University-level courses in high school	Van der Zanden et al. (2018)
Study Skills & Motivation	• Time spent studying • Study strategies • Academic motivation • Effort	Hensley et al. (2021) Van der Zanden et al. (2018)
Institutional Support & Programs	• Orientation programs • First-year seminars • Tutoring for indigenous students • Study-buddy-support (SBS) scheme	Thalluri (2016) Lydster & Murray (2019) Van der Zanden et al. (2018)
Social & Emotional Well-being	• Psychological well-being • Loneliness • Coping self-efficacy • Sense of belonging	Van der Zanden et al. (2018)
Social Relationships	• Parent-child relationships • Faculty and peer relationships • Family communication	Kranstuber et al. (2012) Van der Zanden et al. (2018)
Institutional Characteristics	• Size • Part-time faculty • Degree mix • Tuition • Expenditure • Location	Calcagno et al. (2008)
Accessibility & Equity	• Accessibility of resources • Study abroad programs for students of color	Betts et al. (2013) Bell et al. (2023)
Feedback & Communication	• Quality and consistency of feedback	Diem & Hairrell (2019)
Course Engagement	• Attendance policies • Selection tests for program entry	Comeford (2022) Rosser-Majors et al. (2022)
Critical Thinking Development	• Pre-university critical thinking • Inquiry-based learning • Challenging questions	Van der Zanden et al. (2018)
Financial Support	• Educational tax benefits	Elsayed (2016)
Parental Influence	• Parents' knowledge • Message characteristics and relational satisfaction	Forster & van de Werfhorst (2019) Kranstuber et al. (2012)

METHODOLOGY

Following the literature review, the next step was to find similar variables from an institution, to identify if those data can be obtained, and then to analyze them to assess their impact on student success.

Since there are multiple definitions of student success, for this research we considered semester-level data, and defined student success as the completion of all the courses students registered in any given semester with a grade of C or better.

The study was completed using data from a public, 2-year, profession-focused institution in the US Midwest (Carnegie: Associate, Small), enrolling around 3,000 degree-seeking students a year; around 23% were students of color and around 45% had a Pell award for fiscal year 2024. We integrated records from the Student Information System (SIS) and the EAB early alert platform (Starfish) for seven semesters, from Spring 2022 through Spring 2024:

- Fiscal year 2022: Spring 2022
- Fiscal year 2023: Summer 2022, Fall 2022, Spring 2023
- Fiscal year 2024: Summer 2023, Fall 2023, Spring 2024

  Records were keyed by unique student identifier and semester. Analyses were conducted at the semester level. The following variables were made available through the institution after institutional research board (IRB) approval:

Table 2. List of Variables with Operational Descriptions and Coding Scheme

Variables	Description	Coding Scheme	
Admission Status	This identifies if the student is a regular student or a transfer student.	Dummy1 (R-T)	Dummy2 (R-PD)
		0: Regular	0: Regular
		1: Transfer	0: Transfer
		0: Previous degree	1: Previous degree
Advisor Contact	This identifies if the student had contact with an advisor after a flag was raised.	1: Had contact with advisor	
		0: Did not have contact with an advisor.	
Age group	This identifies if the students are traditional or nontraditional.	1: Age 25 or older	
		0: Age 24 or younger	
Completion (Student \ success)	This identifies if a student completed all the courses they enrolled in any given semester with C or better.	1: Completed	
		0: Not completed	
First Generation	Neither parent has completed postsecondary education.	1: Yes	
		0: No	
Flag	Students identified to have some concerns in at least one of the classes, with the concern raised by faculty or advisor.	1: Flag raised	
		0: No flag	
Gender	This identifies the gender of the student.	Dummy1 (M-F)	Dummy2 (M-O)
		0: Male	0: Male
		1: Female	0: Female
		0: Other	1: Other
Kudos	Students received kudos (positive feedback) from an advisor or faculty member during the semester.	1: Received kudos	
		0: Did not receive kudos	
Pell Eligibility	This identifies if the student is Pell eligible.	1: Pell eligible	
		0: Unknown	
Student of Color (SOC)	This identifies if the student's race was White or not.	1: Yes	
		0: No	
Referrals	Students were referred to tutors or other student services.	1: Students referred to services	
		0: Students not referred to services	
Scholarship	Received financial assistance that was coded as scholarship by the institution.	1=Received scholarship	
		0=Did not receive scholarship	
Student Status	This identifies if the student is a freshman, sophomore, junior, or senior.	Dummy1 (F-P)	Dummy2 (F-S)
		0: Freshman	0: Freshman
		1: Previous degree	0: Previous degree
		0: Sophomore	1: Sophomore
Term Load	This identifies if the student is taking courses as a full-time or part-time student.	1: Full time	
		0: Part time	

Categorical variables were dummy coded with a single reference category per variable to ensure interpretability and model consistency. Reference categories were Male (Gender), Freshman (Student Status), Regular (Admission Status), No (Pell eligibility, Student of Color, Term Load, Flag, Kudos, Advisor Contact, Scholarship, Referral), Traditional (Age Group). Dummy indicators were created for all nonreference levels. Binary variables were coded 0 = No, 1 = Yes.

Data collected for these variables included all students age 18 and older who were admitted as regular or transfer students, or students with previous degree, between the Spring semester of 2022 and the Spring semester of 2024. The dataset was assembled using fiscal year, semester, and unique student identifiers to define unique records for analysis. Student success was measured using the completion variable.

We conducted range and logic checks across all fields, deduplicated records by student–semester keys, and validated joins across SIS and early alert sources. Missing data rates were reviewed per variable; records with missing values on analysis fields were excluded. Future work will examine missingness patterns (missing completely at random [MCAR]/missing at random [MAR]) and potential exclusion bias.

Since students continue to take courses for multiple semesters, we analyzed each semester's data independently. Given repeated measures across semesters, results are interpreted as exploratory patterns; future validation will require student-level aggregation or mixed-effects with clustered errors. For this study, predictive modeling was preferred to help with the data analysis. Table 3 summarizes the descriptive statistics of the dataset collected as part of this study.

Table 3. Descriptive Statistics of the Study Sample

Terms		Semester 1	Semester 2	Semester 3	Semester 4	Semester 5	Semester 6	Semester 7
Student Count		1,970	387	2,109	1,901	372	2,021	1,829
Term Load	Full Time	59%	53%	61%	60%	54%	61%	60%
Age Group	Non-Trad	33%	33%	32%	34%	36%	32%	34%
Admission Status	Previous Deg	3%	3%	3%	3%	3%	3%	3%
	Transfer	46%	47%	44%	46%	52%	41%	45%
Class	Freshman	26%	21%	36%	22%	17%	36%	24%
	Sophomore	71%	76%	61%	75%	80%	61%	73%
	Previous Deg	3%	3%	3%	3%	3%	3%	3%
Gender	Female	62%	71%	61%	61%	75%	62%	63%
First Gen	Yes	26%	31%	26%	26%	26%	26%	26%
Pell Elig	Yes	47%	42%	46%	46%	47%	47%	47%
Student of Color	Yes	23%	21%	22%	22%	19%	22%	22%
Flag	Yes	24%	12%	26%	27%	16%	7%	25%
Referral*	Yes	4%	1%	4%	4%	0%	0%	5%
Kudos	Yes	54%	36%	43%	44%	29%	1%	48%
Advisor Contact	Yes	42%	26%	50%	58%	25%	29%	2%
Scholarship	Yes	26%	32%	28%	29%	31%	27%	26%
Completion	Yes	77%	92%	77%	78%	92%	76%	80%

Note: * Categories reported as 0% reflect proportions below 1%, despite the presence of corresponding cases in the underlying dataset.

Several intervention-related variables (e.g., referrals, advisor contact, kudos) show unusually low frequencies in select semesters. These patterns are due to staffing changes, system adoption timing, and evolving data-entry practices rather than to the absence of student support activity. Reported values reflect recorded administrative data and may underrepresent informal or undocumented interventions.

This study employed two complementary analytic approaches: Random Forest decision trees and generalized regression (logit function), because each addresses a distinct interpretive objective. Random Forest models were used to capture complex, nonlinear interactions among predictors and to identify combinations of characteristics associated with elevated risk or advantage. By averaging across multiple decision trees, this approach reduces overfitting and provides a robust assessment of relative variable importance. Five-level decision trees were generated to illustrate how predictors differentiate student outcomes and to identify student groups that may benefit from targeted or differentiated interventions.

While Random Forest models are well suited for ranking predictors and identifying conditional risk patterns, they do not provide interpretable probability estimates. To estimate average, population-level effects, generalized regression models with a logit link were applied. Logistic

regression produces odds ratios that quantify the direction and magnitude of association between each predictor and the likelihood of completing all registered courses, holding other variables constant. Using both approaches allows the analysis to integrate segmentation-based insights with population-level inference; differences across methods are therefore expected and substantively meaningful.

RESULTS

The results from Random Forest are shared in Figures 1a through 1g. The performance metrics of the model demonstrated generally strong predictive performance throughout the seven semesters. Its accuracy, which shows how often the model guessed correctly, ranged from 0.764 to 0.947, while F1-scores, a measure that balances correct predictions with avoiding mistakes, ranged from 0.75 to 0.93. Semesters 2 and 5, which had the smallest sample sizes, achieved the highest performance, with both accuracy and F1-scores exceeding 0.93, suggesting that predictions for these cohorts were highly reliable. However, because these groups were small, these very high numbers might be somewhat misleading.

For the larger semesters, including Semesters 1, 3, 4, 6, and 7, accuracy and F1-scores were 0.764–0.831 and 0.75–0.82, respectively, indicating that the model performed consistently even across variables and larger datasets. Semester 6 posed a slightly greater challenge, exhibiting the lowest F1-score and accuracy among the larger cohorts, possibly reflecting increased complexity or variability in the underlying data. Overall, the model demonstrated reliable performance across all semesters, with exceptionally high accuracy in smaller, more-uniform cohorts; the model showed moderately lower, but still robust, predictive power in the larger, more-complex datasets.

In addition, across the seven semesters the five-level decision trees consistently identified a core set of predictors associated with student outcomes. PELL_ELIG_FLAG (Pell Grant eligibility) and scholarship status frequently appeared as root nodes, confirming the strong predictive power of financial aid for academic performance and persistence. Students with financial support were consistently more likely to succeed. CLASS, AGE_GROUP, and GENDER functioned as demographic and academic indicators, generally appearing deeper in the trees and suggesting a secondary, though still relevant, influence. Among these, CLASS (class level) was particularly critical, with freshmen consistently at higher risk compared to students in advanced levels.

Institutional engagement variables—including Flag, Referral, Kudos, and Advisor Contact—also emerged as prominent features, underscoring the influence of early-alert systems and targeted interventions. Flag and Referral reliably identified students experiencing academic difficulty, whereas Kudos were positively associated with persistence and stronger performance. Advisor Contact demonstrated a dual role: in earlier semesters it appeared to facilitate student success, while in later semesters it often reflected students already encountering challenges. The presence of ADM_STAT (admission status) in later models, together with AGE_GROUP and GENDER, further suggests their increasing relevance over time.

Collectively, these findings highlight the dynamic interplay between financial, demographic, and behavioral factors, with financial aid and institutional engagement consistently emerging as the most

significant levers for student success. Importantly, the models also indicated shifting patterns of influence, as factors such as admission status and referrals gained predictive weight in later semesters. Overall, the Random Forest analysis demonstrates that financial support, academic standing, and timely engagement signals are the most powerful drivers of student outcomes, while demographic factors, though present, play a comparatively minor role.

Figure 1a. Random Forest Model Performance for Semester 1 (Precision, Recall, and F1-Score) and Five-Level Decision Tree Depicting Predictor Significance

Accuracy: 0.7639593908629442

	precision	recall	f1-score	support
0	0.62	0.43	0.51	112
1	0.80	0.90	0.84	282
accuracy			0.76	394
macro avg	0.71	0.66	0.68	394
weighted avg	0.75	0.76	0.75	394

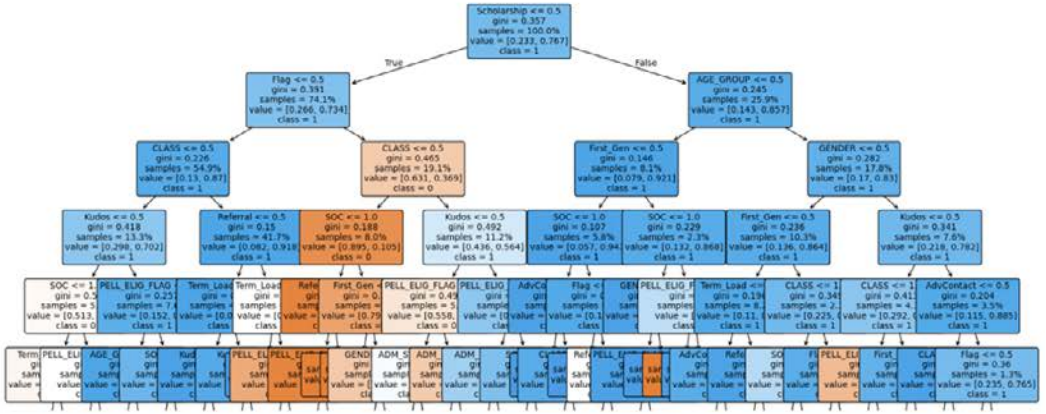


Figure 1b. Random Forest Model Performance for Semester 2 (Precision, Recall, and F1-Score) and Five-Level Decision Tree Depicting Predictor Significance

Accuracy: 0.9466666666666667

	precision	recall	f1-score	support
0	1.00	0.20	0.33	5
1	0.95	1.00	0.97	70
accuracy			0.95	75
macro avg	0.97	0.60	0.65	75
weighted avg	0.95	0.95	0.93	75

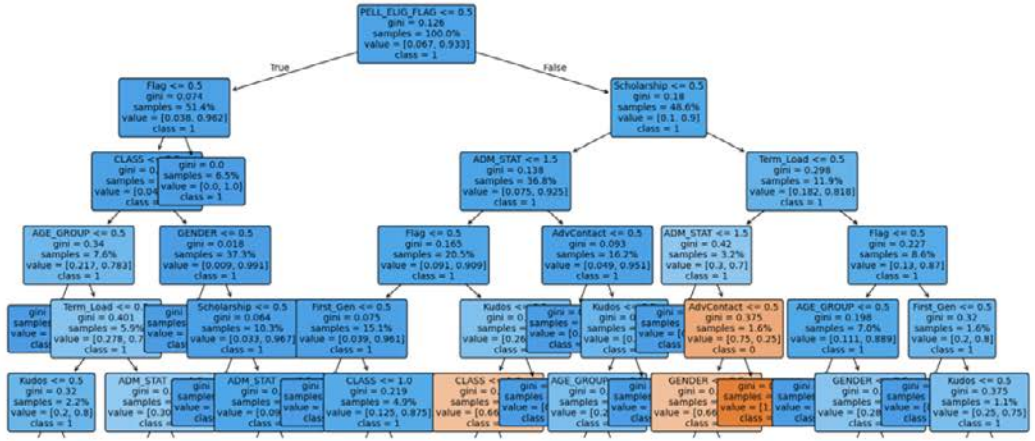


Figure 1c. Random Forest Model Performance for Semester 3 (Precision, Recall, and F1-Score) and Five-Level Decision Tree Depicting Predictor Significance

Accuracy: 0.8151658767772512

	precision	recall	f1-score	support
0	0.54	0.45	0.49	84
1	0.87	0.91	0.89	338
accuracy			0.82	422
macro avg	0.71	0.68	0.69	422
weighted avg	0.80	0.82	0.81	422

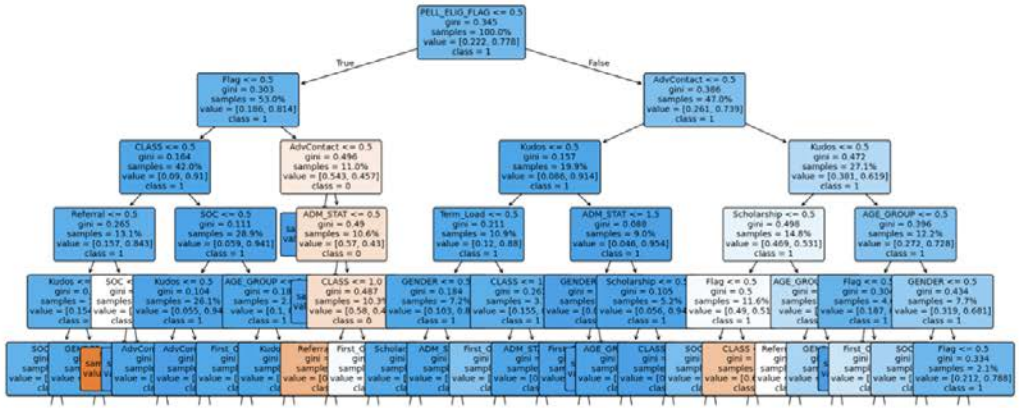


Figure 1d. Random Forest Model Performance for Semester 4 (Precision, Recall, and F1-Score) and Five-Level Decision Tree Depicting Predictor Significance

Accuracy: 0.8293963254593176

	precision	recall	f1-score	support
0	0.63	0.51	0.56	82
1	0.87	0.92	0.89	299
accuracy			0.83	381
macro avg	0.75	0.71	0.73	381
weighted avg	0.82	0.83	0.82	381

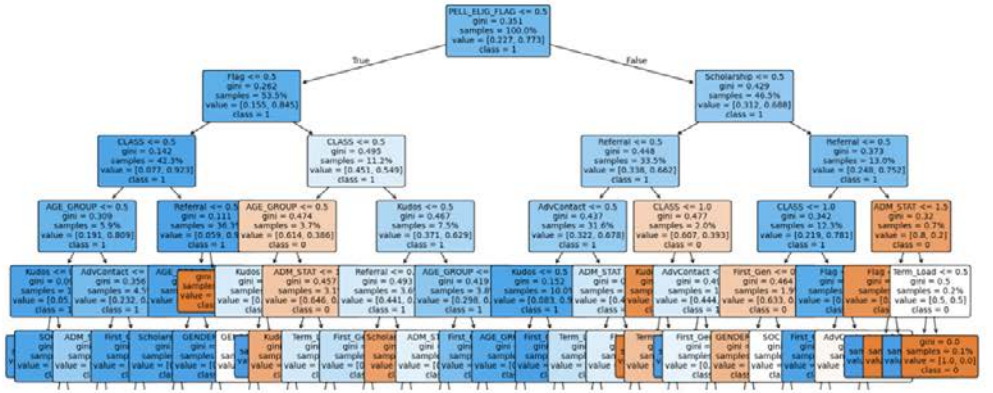


Figure 1e. Random Forest Model Performance for Semester 5 (Precision, Recall, and F1-Score) and Five-Level Decision Tree Depicting Predictor Significance

Accuracy: 0.9466666666666667

	precision	recall	f1-score	support
0	1.00	0.20	0.33	5
1	0.95	1.00	0.97	70
accuracy			0.95	75
macro avg	0.97	0.60	0.65	75
weighted avg	0.95	0.95	0.93	75

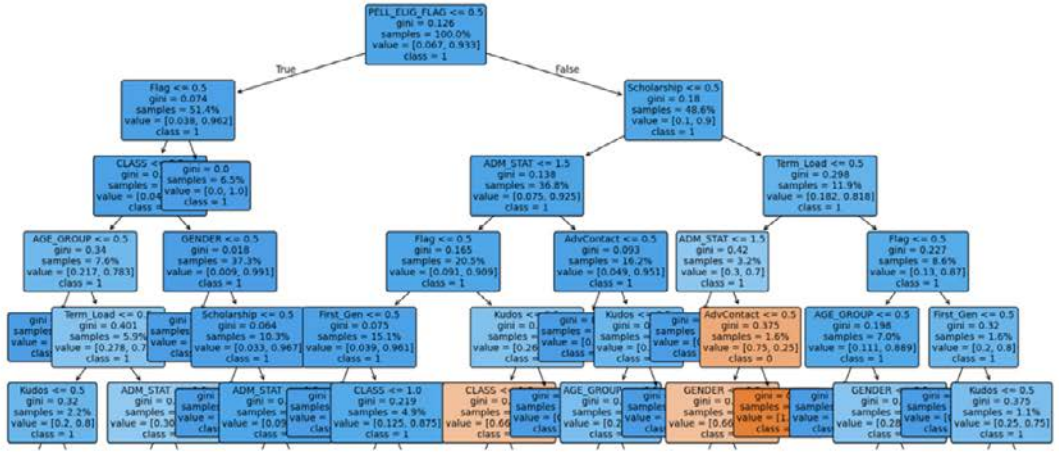


Figure 1f. Random Forest Model Performance for Semester 6 (Precision, Recall, and F1-Score) and Five-Level Decision Tree Depicting Predictor Significance

Accuracy: 0.7679012345679013

	precision	recall	f1-score	support
0	0.53	0.32	0.40	98
1	0.81	0.91	0.86	307
accuracy			0.77	405
macro avg	0.67	0.61	0.63	405
weighted avg	0.74	0.77	0.75	405

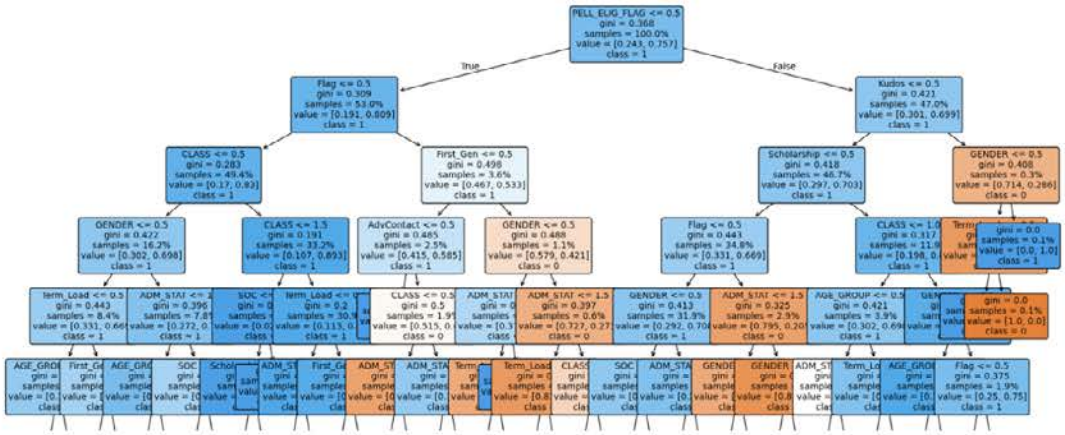
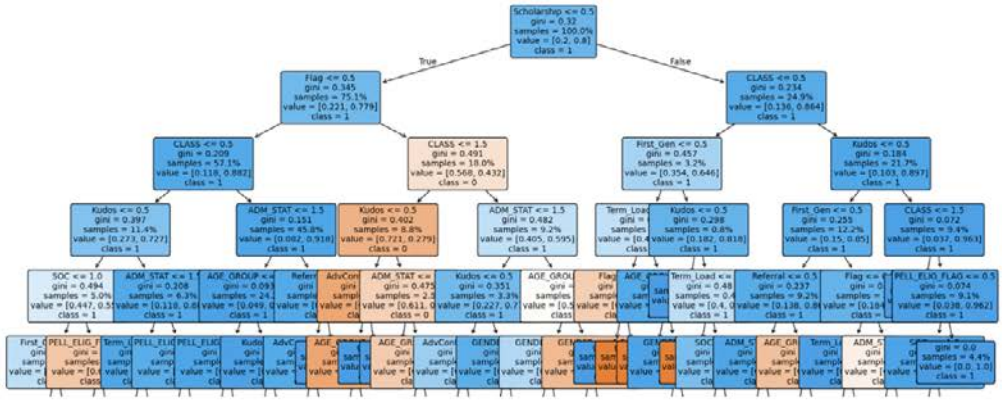


Figure 1g. Random Forest Model Performance for Semester 7 (Precision, Recall, and F1-Score) and Five-Level Decision Tree Depicting Predictor Significance

Accuracy: 0.8306010928961749

	precision	recall	f1-score	support
0	0.57	0.43	0.49	69
1	0.88	0.92	0.90	297
accuracy			0.83	366
macro avg	0.72	0.68	0.70	366
weighted avg	0.82	0.83	0.82	366



Complementing these segmentation-based findings, generalized regression results share significance of predictors and estimate average, population-level associations between predictors and course completion, expressed as odds ratios. The results can be seen in Tables 4 and 5.

Table 4. Statistical Significance (p-value) of Variables by Semester

	p-value						
	Semester 1	Semester 2	Semester 3	Semester 4	Semester 5	Semester 6	Semester 7
Term_Load[F-P]	#	#	#	#	#	#	#
AGE_GROUP[N-T]	#	#	#	#	#	#	#
ADM_STAT[P-T]	#	#	#	#	#	#	#
ADM_STAT[R-T]	#	#	#	#	#	#	#
CLASS[F-S]	***	*	***	***	#	***	***
CLASS[P-S]	.	#	.	#	#	#	#
GENDER[F-O]	#	#	#	#	#	#	#
GENDER[M-O]	#		#	#		#	#
First_Gen[N-Y]	#	#	#	#	#	#	#
PELL_ELIG_FLAG[U-Y]	**	#	#	**	#	***	#
SOC[N-Y]	#	#	#	#	#	*	#
SOC[U-Y]	#					#	#
Flag[N-Y]	***	***	***	***	*	***	***
Referral[N-Y]	#	#	*	*	#	#	*
Kudos[N-Y]	***	#	***	***	**	#	***
Advisor Contact[N-Y]	***	#	***	***	#	***	#
Scholarship[N-Y]	**	#	#	#	#	**	#

Note: # for *p*-value > 0.05, * for *p*-value < 0.05, ** for *p*-value < 0.01, and *** for *p*-value < 0.001.

Conventionally, *p*-value of less than 0.05 is considered significant, and with that definition, data from Table 4 suggests that the most influential predictors of student success are CLASS[F-S] (freshman/sophomore), Flag[N-Y] (No/Yes), Kudos[N-Y] (No/Yes), Advisor Contact[N-Y] (No/Yes), and PELL_ELIG_FLAG[U-Y] (Undefined/Yes) based on their repeated significance over seven semesters. Other factors like Scholarship[N-Y], Referral[N-Y], SOC[N-Y] show significance in some semesters. This suggests their impact may depend on the specific semester or context: impact is not consistent. Finally, factors such as GENDER, First_Gen, AGE_GROUP, Term_Load, ADM_STAT[R-T], CLASS[P-S] do not appear to have much effect on student success in this dataset, since they rarely reached statistical significance.

Table 5. Odds Ratios for 13 Study Variables Across Semesters

	Semester 1	Semester 2	Semester 3	Semester 4	Semester 5	Semester 6	Semester 7
Term_Load							
Full-Time/Part-Time	1	0.6234	1	0.8559	1	1	1.3122
AGE_GROUP							
Non-Trad/Trad	1	0.6581	0.8519	0.8910	1.1825	1	0.9339
ADM_STAT							
Previous Degree/Regular	0.4051	1	1.3946	1	1.6160	1	1
Transfer/Regular	1	1	1	1	1.6160	1	1
CLASS							
Previous Degree/Freshman	3.5839	2.5846	1.8229	3.2090	1.7002	2.7836	3.1194
Sophomore/Freshman	3.6664	2.5846	1.8137	3.2090	1.7002	2.7836	3.1194
GENDER							
Female/Male	1.1313	1.8584	1	1	1	1.0474	1
First_Gen							
No/Yes	1.0434	1	1.2211	1	1	1.0296	1
Pell_Elig_Flag							
Pell Elig/Undefined	0.6493	1	0.9397	0.6768	1	0.6877	0.8762
SOC							
Yes/No	0.8513	1	1	0.9835	0.8277	0.7619	0.7625
Flag							
Yes/No	0.1759	0.0922	0.2018	0.1783	0.3048	0.5013	0.1093
Referral							
Yes/No	0.8515	0.2433	0.6270	0.5379	0.2784	1	0.5529
Kudos							
Yes/No	2.5389	1.1239	2.1076	1.6541	3.1974	1	2.4117
Advisor Contact							
Yes/No	0.4499	1	0.3449	0.3661	0.4933	0.4895	1.1210
Scholarship							
Yes/No	1.6402	1	1.1622	1.2874	1	1.4249	1.1413

Key findings are as follows:

- Sophomores have 3.12× the odds of completing all courses relative to freshmen (Semester 7; similar magnitude across terms).
- A flag is associated with ~0.11–0.50× the odds of completion (strong negative predictor across all terms).
- Kudos are linked to ~1.65–3.20× higher odds of completion.

The analysis of odds ratios across all seven semesters provides a detailed view of the factors influencing student success. Across semesters, certain variables consistently emerge as strong predictors, while others show moderate or inconsistent effects.

Class level is a particularly strong and consistent predictor. Freshmen consistently exhibit lower odds of success compared to sophomores or students with previous degrees, indicating that prior academic experience positively influences student outcomes. Similarly, the presence of a flag is a very strong negative predictor across all semesters, suggesting that students identified as needing intervention are at substantially higher risk of lower academic performance. Positive reinforcement measures, such as kudos, consistently correspond to higher odds of success, highlighting the importance of recognition in motivating and supporting students.

Other variables show more moderate or context-dependent effects. Referrals, which indicate that a student was directed toward additional support services, generally correspond to lower odds of success, though the magnitude of this effect varies across semesters. Scholarship receipt demonstrates a modest positive impact, particularly in the early to mid-semesters, suggesting that financial support facilitates better academic outcomes. Likewise, advisor contact is mostly associated with improved odds of success, although a slight reversal is observed in Semester 7, potentially reflecting targeted intervention for students who are already struggling.

In contrast, several demographic and enrollment-related variables, including age group, gender, first-generation status, term load, Pell eligibility, and admission status, exhibit weak or inconsistent effects. Their odds ratios are frequently close to 1, indicating minimal direct influence on student success across semesters.

DISCUSSIONS

Viewed together, the Random Forest and generalized regression results provide a complementary understanding of student success that integrates conditional risk patterns with population-level associations. The Random Forest analyses highlight how combinations of financial context, academic standing, and engagement signals differentiate groups of students with varying likelihoods of course completion, offering insight into which students may benefit from targeted or differentiated interventions. The regression results clarify which factors are most consistently associated with student success across the population, underscoring the strong positive association of academic standing and positive reinforcement (kudos), as well as the substantial negative association of academic flags.

Support-related variables such as referrals, scholarships, and advisor contact demonstrate context-dependent associations, with effects varying across semesters. These patterns suggest that the

timing and circumstances of interventions may influence their relationship with student outcomes. Consistent with prior research, demographic and enrollment characteristics exhibit comparatively weak and inconsistent associations with semester-level course completion in this institutional context.

Overall, differences between the two analytic approaches reflect their distinct interpretive lenses rather than a contradiction. Decision trees emphasize segmentation and conditional risk, while regression models summarize average effects across the student population. Together, the findings reinforce the importance of early identification of academic difficulty, recognition of positive academic behaviors, and structured support (particularly for freshmen) as central components of effective student success strategies.

CONCLUSION

This study underscores the importance of data-informed strategies in predicting and enhancing student success in higher education. Through a comprehensive literature review and analyses using Random Forest and generalized regression models, it identifies academic standing, early alert indicators (e.g., flags), and positive reinforcement (e.g., kudos) as the most consistent and impactful predictors of student success. Financial support mechanisms, including Pell eligibility and scholarships, along with institutional engagement through advisor contact and referrals, also play meaningful—though context-dependent—roles in influencing outcomes.

Conversely, demographic and enrollment characteristics such as gender, age group, first-generation status, and term load showed limited predictive power, suggesting that, while these factors can shape student experiences, they are less effective in forecasting academic performance within the studied context.

These findings point to actionable opportunities for institutions to strengthen student success initiatives. Expanding access to financial aid and scholarships can directly improve persistence, particularly among first-year students. Targeted support for freshmen is especially impactful, given their consistently higher risk of academic difficulty. The demonstrated effectiveness of early-alert mechanisms underscores the need for robust systems to monitor and respond to student progress, while advisor contact should be strategically managed to serve as proactive guidance rather than merely reactive support. Additionally, the growing influence of admission status and referrals in later semesters highlights the importance of ongoing monitoring beyond the first year.

Overall, by prioritizing proactive academic support, timely interventions, and recognition systems, higher education institutions can align resources with evidence-based predictors of success. Such alignment enables institutions to focus on the most influential drivers of student achievement while continuing to address broader demographic and academic factors, ultimately improving persistence and overall student outcomes.

LIMITATIONS OF THE STUDY

This study encountered some limitations that may affect the generalizability of its findings. Key variables, including Satisfactory Academic Progress (SAP) status, instructor-specific information, and detailed student service interactions, were excluded due to data access restrictions and privacy regulations. Moreover, the analysis was confined to a

3-fiscal-year period, which might not capture longer-term trends or variations. Some variables also lacked sufficient data for robust statistical inclusion.

The study relies on observational institutional data, introducing potential selection bias. For instance, students who received advisor contact or early alerts may differ systematically from those who did not, in ways not captured by the available variables (e.g., motivation, prior academic preparation). These unmeasured confounders can influence both the likelihood of intervention and academic outcomes. While predictive models such as Random Forest are robust to certain assumption violations, logistic regression requires independence of observations and correct specification of relationships among predictors—assumptions that were not formally tested here. Sensitivity analyses were not conducted because the primary aim of this study was exploratory: to identify predictive patterns rather than to establish causal relationships. Future research should include diagnostic checks for multicollinearity, goodness-of-fit, and independence, and should also consider advanced approaches such as mixed-effects models or propensity score adjustments to mitigate bias and validate findings.

Given these limitations, the results should be interpreted as preliminary. Future research should incorporate a broader range of variables, extend the analytical timeframe, and include data from multiple institutions to strengthen and validate findings. Investigating potential confounding factors and expanding institutional contexts will enhance the reliability and applicability of predictive models in higher education.

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Understanding Ranking Volatility:

HOW METHODOLOGY INFLATES APPARENT CHANGE IN U.S. NEWS & WORLD REPORT'S NATIONAL UNIVERSITIES RANKINGS

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About the Author

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Abstract

U.S. News & World Report's National Universities rankings, published annually, use standard competition ranking, which creates gaps in the ranking sequence when institutions tie. This methodological choice dramatically inflates apparent year-to-year volatility, potentially leading institutions to respond to changes that largely reflect mathematical artifact rather than meaningful performance differences. This study compares standard competition ranking to dense ranking (which eliminates gaps after ties) using 2025 and 2026 National Universities rankings data (U.S. News & World Report, 2024, 2025). Results show that standard competition ranking produces 11 times more apparent volatility than dense ranking: institutions moved between -58 and +75 positions under standard competition ranking versus –6 to +6 under dense ranking. Notably, 112 institutions (28.9%) experienced no change in performance tier yet still moved in standard competition rankings, with 21 dropping by double digits. While this analysis does not address well-documented critiques regarding the validity of underlying ranking metrics, it reveals how ranking methodology itself creates substantial volatility independent of institutional performance changes. These findings have significant implications for institutional research professionals who must interpret ranking changes and advise leadership on strategic responses. The study concludes that institutional stakeholders should consider performance tiers rather than specific numerical positions when evaluating ranking data, and that ranking organizations should report both standard competition and dense rankings to provide clearer information about institutional performance.

Keywords: university rankings, ranking methodology, U.S. News rankings, institutional research, performance measurement

The AIR Professional File, Spring 2026

Article 183

https://doi.org/10.34315/apf1832026

INTRODUCTION

Each fall, U.S. News & World Report (U.S. News) releases its rankings for universities and colleges, triggering strategic planning sessions, resource reallocation decisions, and communications strategies at educational institutions nationwide. Rankings have become a significant driver of institutional decision-making, with presidents, boards, and other stakeholders using year-to-year changes as indicators of institutional trajectory (Hazelkorn, 2015; O'Meara, 2007). Yet a fundamental question remains largely unexamined: How much of the apparent volatility in these rankings reflects genuine changes in institutional quality versus methodological artifact? (The terms "college" and "university" are used interchangeably throughout this article.)

As a former vice president for Institutional Effectiveness, I repeatedly faced this question when presenting ranking data to leadership. Core institutional metrics—retention rates, graduation rates, and other performance indicators we submitted to U.S. News—would remain stable year to year, yet rankings would sometimes shift dramatically. I struggled to reconcile stable performance with volatile rankings, unable to point to specific declines that justified large position drops or improvements that explained large position gains.

This puzzle led to a systematic examination of how U.S. News calculates and reports rankings. The methodology revealed something surprising: the ranking system itself, independent of institutional performance, generates substantial apparent volatility. This volatility stems from a technical choice about how to handle tied institutions—a choice that creates an illusion of dramatic movement even when institutions' relative positions remain fundamentally unchanged.

This article presents an alternative way to analyze university ranking data that reveals how much of the apparent year-to-year volatility is methodological artifact. The findings have important implications for institutional research (IR) professionals who must interpret ranking changes and advise leadership on how to respond.

BACKGROUND AND LITERATURE REVIEW

Context: The Broader Critique of U.S. News Rankings

It is important to clarify that this examination does not seek to defend or validate the underlying metrics used by U.S. News, which have been widely criticized for bias and lack of validity. Rather, this study isolates a specific mathematical artifact—ranking methodology—that exacerbates the instability of these already contested measures. To contextualize the specific focus on volatility, it is necessary to acknowledge the well-documented critiques of the ranking system itself.

- **Measurement validity concerns:** Critics argue that U.S. News rankings heavily favor institutional wealth (Monks & Ehrenberg, 1999) and reputation (Bastedo & Bowman, 2011) over student learning or educational value (Ehrenberg, 2005). The methodology relies on input variables—such as alumni giving and faculty salaries—rather than educational outputs or value-added measures (Gladwell, 2011).
- **Gaming and strategic behavior:** Consistent with Campbell's Law (1979), universities often game the system by altering admissions

protocols or financial aid to maximize ranking metrics rather than educational value. O'Meara (2007) characterizes this gaming behavior as a striving for prestige that fundamentally alters institutional priorities, leading leaders to direct resources toward visible ranking indicators at the expense of core educational missions (Espeland & Sauder, 2007, 2016).

- **Equity implications:** Rankings often reinforce existing hierarchies by favoring wealthy institutions that can afford to spend more per student, effectively penalizing schools that prioritize access for low-income or underrepresented students (Hazelkorn, 2015). Recently, this conflict between ranking metrics and institutional mission has led to high-profile withdrawals from the rankings, with leaders arguing that the metrics actively discourage support for public service and social mobility (Thorp, 2023).
- **Questionable weighting schemes**: The relative weights assigned to different metrics lack empirical justification for measuring educational quality and change periodically, creating additional volatility unrelated to institutional performance (Hines & Brooks, 2025). These weight adjustments can dramatically shift institutional positions without any change in institutional behavior or quality. Critics argue that this volatility serves a commercial purpose, since year-over-year changes drive public interest and website traffic.
- **False precision:** Critics argue that the publication of a precise ordinal list implies meaningful differences between institutions that are statistically indistinguishable (Clarke, 2005). Research suggests that institutions naturally cluster into broad bands of quality, and the specific numerical gaps between them often represent statistical noise rather than real performance disparities (Gnolek et al., 2014).

These critiques are valid and important. However, this article does not attempt to defend or validate the underlying metrics used by U.S. News. Rather, it addresses a distinct but related issue: Even accepting the metrics as given, the ranking methodology itself creates an additional layer of apparent volatility that obscures actual institutional performance patterns.

This distinction matters for institutional researchers who must communicate ranking results to stakeholders. When a university moves from #47 to #52, institutional leaders, trustees, and the public often assume this reflects declining performance. Understanding that such movements may be methodological artifacts—rather than genuine performance changes—provides IR professionals with crucial context for these conversations. Universities do not change radically from year to year, and yet the ranking methodology creates exactly this impression of dramatic change.

The analysis that follows demonstrates that switching from standard competition ranking to dense ranking—while keeping all underlying performance metrics identical—reduces apparent volatility more than 10-fold. This finding helps explain why mid- and lower-tier institutions experience seemingly dramatic ranking swings despite stable performance, and provides IR offices with a framework for a more nuanced interpretation of ranking changes.

The Impact of Rankings on Higher Education

The influence of U.S. News rankings on higher education is well documented. Research shows that rankings affect student application patterns (Monks & Ehrenberg, 1999), institutional resource allocation (Bastedo & Bowman, 2011), and strategic priorities (Espeland & Sauder, 2007). Hazelkorn's (2015) comprehensive review found that rankings drive institutional behavior globally, with institutions devoting significant resources to improving their positions.

Critics have noted several concerns about ranking methodologies. Sauder and Espeland (2009) documented how rankings create reactivity, causing institutions to optimize for measured indicators rather than for broader educational goals. Ehrenberg (2005) questioned whether the metrics used by U.S. News measure educational quality. More recently, several prestigious institutions have withdrawn from participating in U.S. News rankings, citing concerns about methodology and impact on institutional mission, including law schools (Jaschik, 2022) and subsequently multiple top medical schools (Jaschik, 2023).

While critics note that full underlying data are not always released (Clarke, 2002), U.S. News does publish detailed methodology documentation annually, providing transparency about the metrics and weighting used in its rankings (Hines & Brooks, 2025). This openness allows for the kind of methodological analysis presented in this study.

Despite this transparency and extensive critique of what rankings measure, less attention has been paid to how rankings are calculated and reported. This study addresses that gap by examining how the technical choice of ranking method affects apparent institutional volatility.

Ranking Methods in Statistics

When multiple entities achieve the same score and tie, ranking systems must decide how to number subsequent positions. Statistics literature identifies two approaches of particular interest (Cimbala, 2014):

- **Standard competition ranking** assigns tied entities the same rank number, then skips enough subsequent ranks to account for all tied positions. For example: 1, 2, 3, 4, 4, 6 (the next position after a two-way tie for 4th is 6th).
- **Dense ranking** assigns tied entities the same rank number but makes the next rank simply the next integer. For example: 1, 2, 3, 4, 4, 5 (no gaps in the sequence).

Each method preserves identical information about which entities performed better or worse, and maintains all tie relationships. The only difference is whether gaps appear in the numbering sequence.

The choice between these methods is not merely cosmetic. Standard competition ranking treats the next position after a tie as genuinely reflecting how many entities performed better. Dense ranking treats rankings as counting distinct performance tiers. This distinction becomes consequential when institutions at all levels of the ranking distribution tie, since the accumulated gaps can push lower-ranked institutions down by dozens of positions—purely as an artifact of how many ties exist above them.

The Institutional Research Challenge

IR professionals face a practical challenge: how to interpret and communicate ranking changes to institutional leadership. When a university drops 25 positions, administrators naturally ask what went wrong. When it rises 30 positions, they want to know what worked. Yet if most of this movement reflects changes in tie patterns rather than institutional performance, IR professionals risk providing misleading explanations that could drive misguided strategic decisions.

METHODOLOGY

Data Source and Sample

This study analyzes U.S. News & World Report's National Universities rankings for 2025 and 2026, the most recent two years available. U.S. News ranks 434 national universities in total. However, the lowest-performing institutions are reported as a tied range rather than with specific numerical ranks (U.S. News, 2024, 2025). Forty-six institutions whose specific numerical ranks were not published in one or both years were therefore excluded from the comparison. The final analytical sample consisted of 388 institutions that received specific numerical ranks in both years.

All data were obtained from publicly available U.S. News rankings published online. The 2025 rankings were published in September 2024 (U.S. News, 2024), and the 2026 rankings were published in September 2025 (U.S. News, 2025).

Ranking Conversion Process

U.S. News reports the rankings using standard competition ranking. I converted these rankings to dense format using a systematic process:

- For institutions ranked 1st with no tie, both standard competition and dense rankings equal 1.
- For each subsequent position in standard competition ranking, if the standard competition rank equals the previous standard competition rank (indicating a tie), the dense rank equals the previous dense rank.
- If the standard competition rank is higher than the previous standard competition rank (no tie), the dense rank increments by 1.

This can be expressed algorithmically as

```
Dense_Rank(i) = Dense_Rank(i-1) + 1
if Standard_Competition_Rank(i) > Standard_Competition_Rank(i-1)
Dense_Rank(i) = Dense_Rank(i-1)
if Standard_Competition_Rank(i) = Standard_Competition_Rank(i-1)
```

For implementation in Microsoft Excel, the formula in cell B2 (where column A contains standard competition ranks sorted in ascending order) is simply as follows: = IF(A2 = A1,B1,B1+1), with cell B1 initialized to 1.

This conversion preserves all performance information from the original U.S. News methodology—every institution maintains its relative position, all tie relationships are preserved, and no performance distinctions are lost. The only change is the elimination of gaps in the numbering sequence.

Analytical Approach

For each institution, I calculated the change in ranking position from 2025 to 2026 under both standard competition ranking and dense ranking (2026 rank minus 2025 rank). In this calculation, positive values indicate a decline in ranking position (e.g., moving from 50 to 75, change = +25), while negative values indicate improvement (e.g., moving from 100 to 85, change = –15). The primary analytical focus was on comparing the distribution and magnitude of apparent changes under each method. Specific analyses included the following:

- **Range of changes:** Minimum and maximum position changes under each method
- **Descriptive statistics:** Mean, median, standard deviation, and interquartile range of absolute changes
- **Variance comparison:** *F*-test to determine whether variance differs significantly between methods
- **Mean absolute change comparison:** Paired-samples *t*-test to assess whether mean absolute change differs
- **Effect size:** Cohen's *d* to quantify the magnitude of difference
- **Stability analysis:** Identification of institutions showing no change in dense ranking but movement in standard competition ranking

All analyses were conducted using Microsoft Excel.

RESULTS

Overall Volatility Comparison

The difference in apparent volatility between the two ranking methods was dramatic. Under standard competition ranking, institutions moved between -58 and +75 positions from 2025 to 2026—a range of 133 positions. Under dense ranking, the same institutions using the same underlying data moved between –6 and +6 positions—a range of 12 positions.

The ratio of ranges (133 positions versus 12 positions) represents approximately 11 times more apparent volatility under standard competition ranking than under dense ranking. Table 1 presents comprehensive comparative statistics for both ranking methods.

Table 1. Comparative Statistics for Ranking Changes (2025 to 2026)

Measure	Standard Competition Ranking	Dense Ranking	Ratio
Range of changes	–58 to +75	–6 to +6	11.1:1
Mean absolute change	8.56	1.13	7.56:1
Median absolute change	5.00	1.00	5.00:1
Standard deviation	9.52	1.07	8.88:1
Interquartile range	11.00	2.00	5.00:1

Note: N = 388 institutions.

Statistical tests confirmed these differences. A paired-samples t-test revealed that mean absolute ranking changes were significantly greater under standard competition ranking than under dense ranking, $t(387) = 16.52$, $p < .001$. The effect size was very large (Cohen's $d = 1.10$), indicating substantial practical differences between methods. An F-test confirmed that variance in ranking changes was significantly greater under standard competition ranking, $F(1, 387) = 84.74$, $p < .001$.

Stability Beneath the Apparent Chaos

Perhaps the most striking finding concerns institutional stability. Of the 388 institutions analyzed, 112 (28.9%) experienced no change whatsoever in their dense rank from 2025 to 2026. These institutions maintained the same position in the performance tier hierarchy—neither improving nor declining relative to their peers. Yet, under standard competition ranking, these 112 stable institutions still moved, with changes ranging from

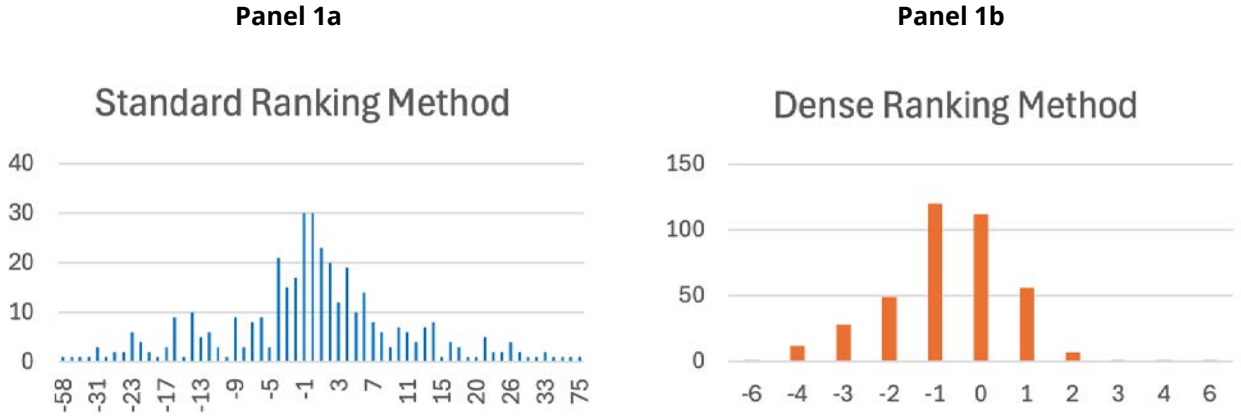
–2 to +22 positions. Twenty-one of these stable institutions changed by double digits in standard competition ranking despite maintaining the same dense rank. This movement occurred not because these institutions declined, but because changes in tie patterns above them in the ranking redistributed the gaps in the numbering sequence.

Consider a concrete example: Florida Gulf Coast University, Louisiana Tech University, and Montana State University each ranked tied with other institutions at 296 in 2025 and 318 in 2026 under standard competition ranking—an apparent drop of 22 positions. However, their dense ranks remained 59 in both years. The 22-position drop in standard competition ranking resulted entirely from increased tying above them, which pushed all subsequent institutions farther down the sequence. The institution's actual performance relative to peers remained unchanged.

Distribution of Changes

The distribution of ranking changes under each method reveals the source of apparent volatility. Under standard competition ranking, changes are widely dispersed, with substantial numbers of institutions experiencing movements of 20, 30, or even 50+ positions. Under dense ranking, changes cluster tightly around 0, with most institutions moving three or fewer positions. Figure 1 shows the greater variability of the ranking changes using the standard competition ranking methodology versus the dense ranking methodology.

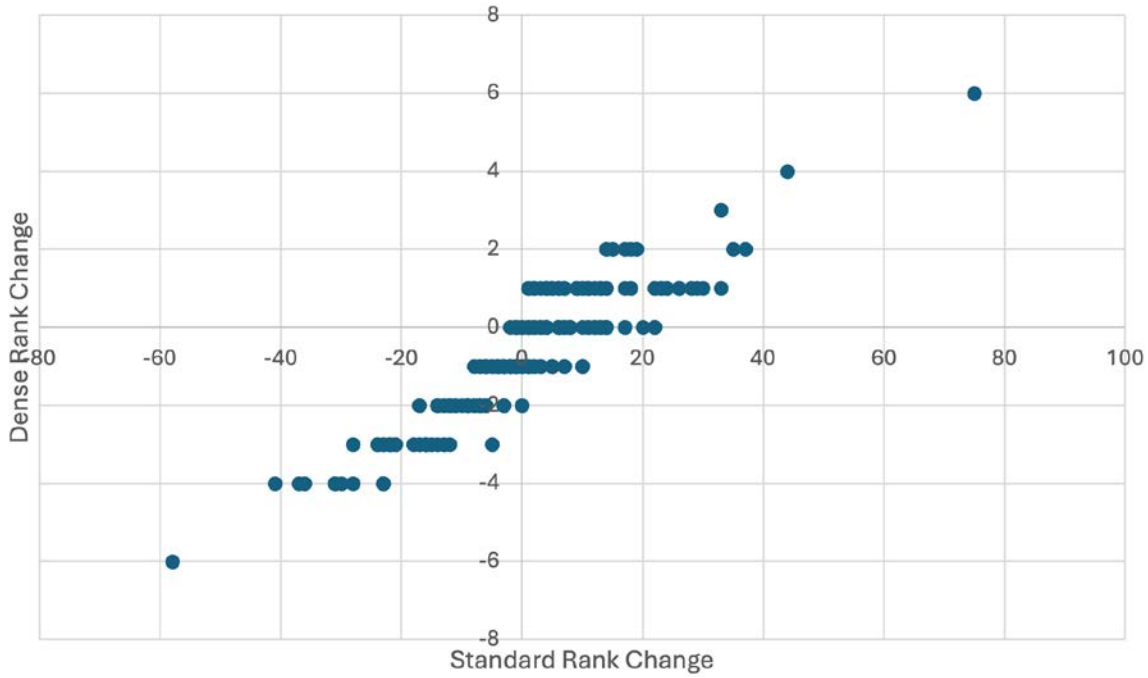
Figure 1. 2025 to 2026 Ranking Volatility by Methodology: Standard Competition vs. Dense Ranking Methods



Note: Histograms showing year-to-year ranking changes for 388 national universities between 2025 and 2026 rankings. Panel 1a shows changes using standard competition ranking methodology (range: –58 to +75, SD = 9.52). Panel 1b shows changes using dense ranking methodology applied to identical performance data (range: –6 to +6, SD = 1.07). Negative (positive) values indicate upward (downward) movement in rankings. Panels use different x-axis and y-axis scales to accommodate distribution characteristics.

While the distributions in Figure 1 demonstrate the overall compression of volatility under dense ranking, Figure 2 reveals an additional dimension of the methodological artifact: institutions with identical performance tier changes experience widely varying standard competition ranking movements.

Figure 2. Relationship Between Standard Competition and Dense Ranking Position Changes.



Note: Scatterplot showing the correspondence between ranking changes under standard competition (x-axis) and dense (y-axis) methodologies for the same 388 national universities. Each point represents one institution. Horizontal banding demonstrates that institutions with identical performance tier changes experienced widely varying standard competition ranking movements. Institutions with no performance tier change (dense = 0) showed standard competition ranking changes ranging from –2 to +22 positions, while institutions improving by one tier (dense = +1) showed standard competition changes from +1 to +33 positions. Negative values indicate upward movement in rankings.

The scatterplot shows a strong positive correlation between the two ranking methodologies (r = .89), indicating substantial agreement on the direction of change. However, the horizontal banding pattern reveals substantial scatter around this relationship. Most notably, institutions experiencing no performance tier change whatsoever (dense rank change = 0) still showed standard competition ranking movements ranging from –2 to +22 positions. This 24-position spread occurred primarily in the positive direction, meaning that most institutions with no tier change experienced apparent declines in their standard competition rankings (despite maintaining stable performance) due to increased tying above them in the distribution.

This pattern demonstrates that much of the year-to-year volatility in standard competition rankings reflects the mathematical properties of the ranking methodology rather than meaningful differences in institutional performance. Two institutions with identical performance trajectories—both improving by one tier, for example—could see dramatically different ranking outcomes (one rising 5 positions, another rising 28 positions) based solely on the distribution of tied scores around them.

DISCUSSION AND IMPLICATIONS

Understanding the Mechanism

The more-than-10-fold difference in apparent volatility between ranking methods results from a straightforward mechanism: changes in tie patterns create cascading effects in standard competition ranking that do not occur in dense ranking.

When institutions at various positions in the distribution begin tying (or stop tying), standard competition ranking must adjust all subsequent positions to maintain the proper gaps. An institution ranked 150th might drop to 170th, not because 20 institutions surpassed it, but because increased tying between ranks 50 and 140 created additional gaps that pushed everyone below down the sequence.

Dense ranking eliminates this artifact by simply counting performance tiers. If more institutions tie at various positions, the dense ranking sequence continues unaffected. An institution's dense rank changes only when its performance relative to peers genuinely improves or declines.

Implications for Institutional Research Professionals

These findings have important practical implications for IR professionals navigating the reality of rankings:

- **Question apparent volatility.** When your institution's ranking changes substantially, examine whether the change reflects genuine performance shifts or redistribution of ties. Converting to dense ranking provides this insight.
- **Focus on performance tiers.** Rather than fixating on whether your institution is ranked 85th or 95th, consider which performance tier it occupies. Dense ranking makes performance tiers explicit.
- **Avoid overreaction.** Dramatic ranking drops that seem to demand immediate strategic response may largely reflect methodological artifact. Verify whether underlying performance metrics changed before launching major initiatives.

- **Educate leadership.** Help presidents, boards, and other stakeholders understand that specific numerical positions are less meaningful than performance tier. Provide context about tie patterns and their effects.
- **Track dense rankings.** Create and maintain dense ranking conversions in your internal dashboards. This provides a more stable indicator of institutional trajectory over time.

For institutions contemplating substantial resource investments to improve rankings, dense ranking analysis can help determine whether resources would address genuine performance gaps or merely respond to methodological noise.

None of these recommendations requires endorsing rankings as valid measures of educational quality. They simply provide institutional researchers with more-sophisticated tools for interpreting a phenomenon that significantly affects their institutions—regardless of whether they believe rankings should have such influence.

Implications for Ranking Organizations

These findings also suggest that ranking organizations like U.S. News should consider reporting both standard competition and dense rankings. This would provide stakeholders with more-complete information:

- Standard competition rankings preserve the traditional interpretation of relative position.
- Dense rankings clarify performance tiers and reduce apparent volatility.
- Together, they provide a more nuanced understanding of institutional standing.

Limitations

This study has several limitations that should be noted:

- The analysis covers only two years of ranking data (2025 and 2026). Patterns may differ across longer time periods, though preliminary examination of earlier years suggests similar magnitudes of difference.
- The study focuses solely on U.S. News & World Report's National Universities rankings. Other ranking systems (e.g., Forbes, Times Higher Education, or QS World University rankings) may show different patterns, depending on their methodologies and the extent of tying.
- This analysis does not evaluate whether the underlying U.S. News methodology accurately measures institutional quality, which is a separate and well-documented concern in the literature. Rather, it examines how the choice of ranking method affects apparent volatility given whatever underlying scores the methodology produces.
- The study does not examine whether institutions behave differently in response to standard competition versus dense ranking changes. However, extensive research has documented that institutions respond strategically to ranking changes through resource reallocation (Bastedo & Bowman, 2011), admissions policies (Monks & Ehrenberg, 1999), and organizational restructuring (Espeland & Sauder, 2007). Whether institutions would respond differently to dense ranking changes—which represent more-stable performance tier movements—remains an important question for future research.

Despite these limitations, the findings clearly demonstrate that ranking method choice substantially affects apparent institutional volatility and has implications for how ranking data should be interpreted and used.

CONCLUSION

Rankings have become a consequential feature of the higher education landscape. Institutions devote substantial resources to improving their positions, and stakeholders use rankings to assess institutional performance and trajectory. Given this significance, it is crucial that ranking data be interpreted accurately.

This study demonstrates that much of the apparent year-to-year volatility in U.S. News rankings reflects methodological artifact rather than genuine changes in institutional performance. By converting standard competition rankings to dense rankings, we can distinguish real movement in performance tiers from mathematical noise created by redistribution of ties.

For IR professionals, this analysis provides both a diagnostic tool and a communication framework. When rankings change dramatically, IR professionals can now determine whether the change warrants strategic response or whether it merely reflects tie pattern redistribution. When presenting ranking data to leadership, IR professionals can focus attention on performance tier movement rather than on specific numerical positions, providing more-accurate information for decision-making.

The broader implication is that precision in numerical ranking position may be illusory. When dozens of institutions occupy similar performance levels and tie at various points in the distribution, small changes in tie patterns create cascading effects throughout the ranking sequence. Specific numerical positions become largely arbitrary—more a function of how many ties exist above you than of your actual performance.

Perhaps the most important lesson is the importance of humility about what rankings can tell us. They provide useful information about broad performance tiers—which institutions are in the top 50, which are in the 100–150 range, and so forth. But the difference between being ranked 87th and 102nd may be entirely meaningless, reflecting nothing more than how the numbers happened to fall given current tie patterns.

IR professionals serve as crucial interpreters of ranking data. By understanding the methodological choices that inflate apparent volatility, IR professionals can help their institutions focus on genuine performance improvement rather than on responding to mathematical artifacts.

It is critical to emphasize what this analysis does and does not claim: It does not suggest that dense ranking would fix or correct the underlying limitations of college rankings, nor does it validate the metrics used by U.S. News. The fundamental concerns about measurement validity, gaming behavior, equity implications, and arbitrary weighting schemes remain, regardless of which ranking methodology is used. As Goodhart's Law (Goodhart, 1975) reminds us, in Strathern's (1997) widely cited formulation, "When a measure becomes a target, it ceases to be a good measure." No ranking methodology can overcome this fundamental challenge.

Rather, this analysis provides institutional researchers with tools to better understand and communicate the nature of ranking volatility to stakeholders. By demonstrating that much apparent volatility is a mathematical artifact of the ranking method rather than a reflection of institutional performance changes, IR professionals can help leadership maintain appropriate perspective when rankings fluctuate. A five-position drop may represent no meaningful change in institutional standing when viewed through the lens of performance tiers rather than ordinal ranks.

This perspective does not require endorsing rankings as valid measures of institutional quality. It simply acknowledges the practical reality that rankings exist, stakeholders pay attention to them, and institutional researchers must navigate this landscape effectively. Understanding the mathematical properties of different ranking approaches—and their implications for apparent volatility—equips IR professionals to fulfill this responsibility more effectively.

This study provides IR professionals with a practical tool: converting standard competition rankings to dense rankings reveals which changes reflect genuine performance shifts and which reflect mathematical noise. Armed with this distinction, IR professionals can guide their institutions toward evidence-based responses to ranking changes, focusing resources on actual performance improvement rather than on chasing the illusion of volatility.

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Strengths, Weaknesses, Opportunities, and Threats of Institutional Research:

REFLECTIONS FROM PROFESSIONALS IN INSTITUTIONAL RESEARCH AND INSTITUTIONAL EFFECTIVENESS

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Abstract

Institutional research and institutional effectiveness (IR/IE) offices often support the assessment and performance measurement of postsecondary institutions; however, rarely do we turn those skills upon our own work. Analyzing the strengths, weaknesses, opportunities, and threats (SWOT) in the workplace allows organizations to consider the conditions in which they operate. This article reports on an analysis of responses from *The Node for IR/IE*, a weekly newsletter sent to IR/IE professionals, about the strengths, weaknesses, opportunities, and threats within and outside their offices. Our data analysis process included concurrent inductive and deductive coding followed by a series of meetings to reconcile the coding schemes and develop overall themes. In our analysis, we found that many participants spoke positively of the collaboration and overall environment of their office, but that they also had a variety of concerns about resources and the demands from their stakeholders. The direct contrast between many responses illustrated the vastly different experiences of IR/IE professionals. We discuss the implications of these responses in relation to the current context and how this research can inform and support office leaders and advance the field of IR/IE.

Keywords: institutional research; institutional effectiveness; resources; strengths, weaknesses, opportunities, and threats (SWOT); qualitative research; thematic analysis

The AIR Professional File, Spring 2026

Article 184

https://doi.org/10.34315/apf1842026

INTRODUCTION

Formal analyses of organizations are necessary to determine their capabilities and to develop coherent strategies for improvement. A well-known example of this type of analysis is the examination of an organization's strengths, weaknesses, opportunities, and threats (SWOT). Initially presented as the satisfactory, opportunity, fault, threat (SOFT) approach (Stewart et al., 1965), Stewart developed a series of prompts to answer the following questions (emphasis added):

1| What must be done to safeguard the *satisfactory* in present operations?

2| What must be done to open the door to *opportunities* in future operations?

3| What must be done to fix the cause of *faults* of present operations?

4| What must be done to thwart, ameliorate, or avert the *threats* to future operations? (Puyt et al., 2023, p. 18)

While this model has evolved into the well-known SWOT approach, the value of such an assessment still relies on the evidence collected through internal perspectives, reliable information, and practitioner expertise (Puyt et al., 2023).

Institutional research and institutional effectiveness (IR/IE) are uniquely situated within postsecondary institutions at the intersection of institutional long-range planning and change management. Strategic planning for the postsecondary institution is typically managed by or supported by the IR/IE function through the measurement of key performance indicators. As IR/IE has evolved, a focus on quality enhancement "is both internally driven and externally motivated" (Taylor et al., 2013, p. 63). Self-assessment using SWOT analyses can be employed as a strategic tool by office staff to navigate complex organizational environments and to manage current and future change.

The Association for Institutional Research (AIR) has conducted the AIR National Survey every 3 years since 2015 to examine similar issues through IR/IE leaders' perspectives. While this comprehensive survey examines organizational structures, leadership, staffing, and core work functions, missing from our field is an understanding of strengths, weaknesses, opportunities, and threats of IR/IE offices that may be inclusive of non-leader IR/IE perspectives. Therefore, this article applies Taylor et al., 2013's perspectives to the assessment of an IR/IE office's capabilities and examination of challenges via SWOT analyses. Three broad research questions (RQ) guided our inquiry:

- RQ1: What are individuals' perceptions of the strengths/opportunities within their IR/IE office?
- RQ2: What are individuals' perceptions of the weaknesses/threats within their IR/IE office?
- RQ3: What thematic overlaps exist across each SWOT area and how do these overlaps convey broader perceptions of the IR/IE function?

BACKGROUND

History of IR/IE and Strategic Planning

The duties of IR/IE offices have expanded significantly over the past quarter-century to include more than just the reporting, survey, and ad hoc analytic functions for which the field has historically been known (Reichard, 2012). The Golden Triangle framework of Volkwein et al. (2012) describes the roles that modern IR/IE offices must now balance: reporting and policy analysis; planning, enrollment, and financial management; and outcome assessment, program review, effectiveness, and accreditation. As the breadth of IR/IE's responsibilities has grown, so too has the need for constructing a plan to meet these demands in a way that honors an office's institutional mission and accounts for the constraints under which the office operates.

Strategic planning is an excellent tool to achieve that end. Though the practice has steadily become a foundational characteristic of higher education administration over the past 10 to 15 years, Trainer (2004) was discussing the intersection of institutional strategic planning and institutional research (IR) more than 20 years ago. However, the conversation mostly focused on IR/IE's role in a larger, institutional strategic plan—not the construction of a plan *for* IR/IE offices. Though there are varied tools and frameworks that an office can use to facilitate the strategic planning process, SWOT not only "lies at the heart" of it, it is "one of the most familiar" (Trainer, 2004, pp. 133–134), and therefore lends itself to high-workload, understaffed, and/or overextended IR/IE offices.

What Is SWOT, and Where Did It Come From?

SWOT addresses the environmental scanning phase of strategic planning (Hunger & Wheelen, 2003) by providing a framework for unit employees to discuss their strengths, weaknesses, opportunities, and threats. Conducting a SWOT analysis asks participants "to think about the context in which a given organization functions and to assess the competition" (Trainer, 2004, p. 134). Often formatted as a matrix where impact (across the top) and scope (down the side) are intersected, a typical SWOT looks like Figure 1.

Figure 1. Matrix of Impact and Scope Used to Produce the SWOT Framework

		Helpful	Harmful
Internal	to the organization	Strengths Internal, helpful characteristics, e.g., "What are we doing well?"	Weaknesses Internal, harmful characteristics, e.g., "What could we improve?"
External	to the organization	Opportunities External, helpful characteristics, e.g., "What trends are evident in the sector?"	Threats External, harmful characteristics, e.g., "What policies or changes might significantly impact how we operate?"

Based in private industry in the 1950s, SWOT's predecessor, strengths, opportunities, faults, and threats (SOFT) was developed as a way for operational staff to communicate their views to upper management (Puyt et al., 2020). SOFT enabled an increasingly democratized process for building corporate strategy; it evolved into SWOT through the mid-1960s (Learned et al., 1965; Puyt et al., 2020). As in its original iteration, SWOT remains a valuable tool when an IR/IE office is beginning the strategic planning process for the first time, reinvigorating it after a period of dormancy, or refreshing it after significant change or growth in a unit.

How Does SWOT Compare to Other Strategic Planning Strategies?

There are a multitude of other processes and frameworks that address the foundation-building of a strategic plan, including political, economic, social, technological, legal, and environmental (PESTLE) factors (Christodoulou & Cullinane, 2019), Gap Analysis (Kim & Ji, 2018), Needs Assessment (Sleezer et al., 2014), Porter's Five Forces (Grundy, 2006), and strengths, opportunities, aspirations, and results (SOAR) (Stavros et al., 2003). However, the primary benefit of conducting a SWOT is the likelihood of prior familiarity among staff. Due to its ubiquity in both the private and public sectors, employees of all backgrounds are more likely to have heard of and/or used SWOT previously as compared to its alternatives. Additionally, the SWOT matrix is relatively simple to explain and understand; organizing thoughts into one of four different areas based on the helpful/harmful and internal/external dichotomies tends to be intuitive once introduced.

SIGNIFICANCE

Why Is Conducting SWOT Analysis Important in IR/IE?

In a fast-paced and/or high-demand environment, it can be difficult to intentionally carve out time to pause and look around, identify challenges and assets surrounding the work of the office, and build a roadmap for how the office should respond. The SWOT analysis framework is one of the easiest tools to facilitate that pause and review. However, most IR/IE practitioners have not used it recently. Readers of *The Node for IR/IE* (hereafter, *The Node*) were asked on June 5, 2024, if their office had conducted a SWOT analysis to support the office's development (Godin & Atchison, 2024). More than 60% responded "No" and about 7% were not sure. This poll indicated that only 33% remember conducting a SWOT in their office; of those, only a third remember doing so recently.

The increase in responsibilities and expectations of IR/IE (Volkwein et al., 2012) lends itself to SWOT in helping to take stock of resources currently available or being granted, as well as understanding what must be gained to effectively complete what is being asked by institutional leadership. Given that many universities have encountered operational challenges, experienced staff turnover, and seen fiscal shifts since the COVID-19 pandemic (CUPA-HR, 2024; Flannery, 2022; Kelchen et al., 2024), it stands to reason that IR/IE offices may experience similar disruptive activity. A SWOT analysis could prove to be an important tool in understanding the impact of these changes and in developing shared direction and purpose in this environment.

Why Is Research About SWOT in IR/IE Important?

Though SWOT as a strategic planning method has ample literature discussing its utility, there is a dearth of published research articles regarding its direct usage and implementation specific to IR/IE. This article begins the conversation about why using this specific methodology in this field is helpful. SWOT in this article provides a structural framework for national organizations including AIR, EDUCAUSE, and the like to understand the sentiments of IR/IE professionals. This study aids these groups in advocating for the value this discipline provides and the support that is needed to continue providing that value.

Additionally, conducting this research on a broader scale informs leadership development across IR/IE. Much of the content and strategies discussed to support or initiate strategic planning are done from an office-level perspective, or with an IR/IE office as a stakeholder within an institution. However, conducting this analysis across institutional boundaries and instead looking more broadly at the field and its common themes reframes how leadership within those offices can look at and reference SWOT as a tool. Particularly if the IR/IE field is thought of as an organization characteristic of its individual offices, this research gives leadership an understanding of the sentiments that may be present in their own offices.

DATA SOURCE

The Node is a free weekly e-newsletter highlighting news, reports, updates, and perspectives from IR/IE professionals that was developed in 2021. It includes 10–15 timely resources each week, and currently has more than 2,400 subscribers across 850+ diverse postsecondary institutions and 150+ organizations. Two-thirds of subscribers represent institutional leadership (director level and above). Readership reaches most institution classification types, from associate's colleges to doctoral universities, special focus institutions, and districts/systems.

In addition to sharing news and articles of interest, readers are engaged through weekly poll questions that ask about working in IR/IE, institutional context, and personal/professional background. Results are presented the following week in aggregate; response rates typically represent 10% to 15% of subscribers.

METHODOLOGY

Data Collection, Respondents, and Characteristics of Responses

The data for this study was collected via a series of four weekly polls administered by *The Node*. Starting on January 11, 2023, and continuing for the following 3 weeks, readers of *The Node* were asked this question stem: "What are the greatest ____ of your IR/IE office?" The blank in the question stem was filled in with "strengths," "weaknesses," "opportunities," and "threats" on January 11, January 18, January 25, and February 1, respectively. An additional instruction was provided on all four poll questions: "Include up to 3, no need to rank order responses, include a few words each in the text box below separated by comma or period)."

The number of responses ranged between a high of 96 on the 1st week where subscribers were asked about strengths, to a low of 50 on the 3rd week when asked about opportunities (Figure 2). Due to the anonymous nature of the poll, we do not know the characteristics of the respondents, which we discuss more fully in the Limitations section of this article. However, we can report on *The Node*'s broader readership at the time. When the polls were distributed, there were approximately 2,041 subscribers: 91% (1,867) of the subscribers worked at U.S. colleges or universities, 1% (17) worked at non-U.S. colleges or universities, and 8% (157) worked at some other type of educational organization. Of those who worked at U.S. colleges or universities, 77% worked at 4-year institutions, 20% at 2-year institutions, and the remaining worked within some sort of administrative unit (e.g., system or district office). In addition, within the 93% who worked at U.S. institutions, 66% identified as administrators, 29% were non-administrators, and the remaining worked in some other category.

Figure 2. The Topics, Dates, and Number of Responses to The Node's SWOT Polls

Following the additional instructions, the responses were brief, ranging between 1 and 103 words. Most responses (about 275 of the 302) were individual words or phrases with very few (about 25 of the 302) including full sentences. We discuss the limitations of the responses in more detail in the Limitations section.

Early Analysis

There were three separate analyses of the 302 responses to *The Node*'s SWOT poll series. The first analysis was composed of 5 to 15 responses by frequency included in the subsequent weeks' newsletters. This analysis provided a quick overview of the responses, acknowledged respondents' time, and encouraged responses to the next poll. Graphics of the first analysis, as presented in the newsletters, are included in Appendix A.

The second analysis was conducted with the purpose of demonstrating how to use a specific software feature, Qualtrics' Text iQ, at a regional IR conference, the Southern Association for Institutional Research (SAIR), in Point Clear, Alabama, in October 2023. Developed to help survey administrators quickly analyze open-ended survey items, Text iQ gives researchers the ability to identify key words or phrases within blocks of text and to tag that entire block of text with a topic. Blocks of text can be assigned more than one topic, and the feature allows for a second level of topics to help group similar topics under different categories.

To fully demonstrate different applications of the Text iQ software, we engaged in inductive and deductive (Saldaña, 2014) coding procedures. Specifically, before the deductive coder read the responses, they used their experience in an IR office to develop a coding structure that would reflect what they expected to find in the responses. They created queries that directed Text iQ to apply topics based on their coding structure and then applied those queries to the responses. Separately, the inductive coder engaged in open coding of the responses—in other words, they approached the responses with no coding structure. After skimming several responses, they started to identify patterns in the responses and developed Text iQ queries that they knew would tag the responses with specific topics.

The second analysis, discussed above, was presented at the SAIR 2023 conference as a technical demonstration (Gipalo & Nix, 2023). In addition to discussion about the software features, the conversation shifted to include curiosity about the content of the results. Thus, we began the third analysis with the intent to report our insights to the IR/IE community through this article.

Analytic Process

During the second phase of analysis described above, we recognized that respondents did not follow the traditional practice of referencing internal characteristics for strengths/weaknesses and external attributes for opportunities/threats. For instance, during the week that respondents were supposed to discuss opportunities (which should be external), there were many references to qualities of the staff in their office (which is internal).

To begin the third phase of analysis, two members of the research team engaged in two consolidation efforts. First, they combined responses along the impact dimension of the SWOT matrix: helpful entries (strengths/opportunities) were combined, and harmful entries (weaknesses/threats) were combined. This process was accomplished by simply appending those weeks' responses. Next,

they combined the inductive and deductive coding structures, which included both a first level (hereafter referred to as "themes") and a second level (hereafter referred to as "codes"). They shared each of the structures with one another and identified overlaps between themes/codes or where themes/codes were close concepts of one another. The new coding structure that arose from this consolidation effort was a compromise between each coding effort, and was reflective of both researchers' engagement with the material. With this new consolidated coding structure in hand, they re-read the responses and refined the coding structure even further. This refining process included removing duplicative words, separating distinct concepts into their own themes/codes, and further combining themes/codes when necessary. One researcher executed this work for the helpful (strengths/opportunities) structure, and another researcher executed this work for the harmful (weaknesses/threats) structure.

After consolidation of the coding structures, we undertook the development of themes and synthesis of our findings. This process occurred through team conversations, formal notetaking (approximately 10 meetings with notes), and reflections on the presentation to the regional conference audience. Two research team members synthesized the strengths/opportunities and weaknesses/threats results by talking through each of the themes, comparing similarities and differences in the themes, noting what was and was not discussed in the responses, and imagining the perspectives of colleagues and how the responses might fit together into a cohesive narrative.

We consider the final portion of analysis to include the presentation and conversation of these findings at the 2024 Association for Institutional Research (AIR) Forum and the preparation of this article. During the 2024 AIR Forum, the authors presented the findings of the analysis and implications for the field. The resultant discussion served as an informal member-checking exercise where we received confirmation from audience members on the importance of the work and individual connections to the findings presented. Audience members also expressed interest in leveraging SWOT methods in their own office contexts. Several months after the 2024 AIR Forum, the researchers revisited the coding structure, synthesis, and findings in preparation for developing this article. Two research team members engaged in additional memoing (Saldaña, 2014) to fully define every theme and code. The deep thinking and reflection of the memoing process led to small changes in the structure and further refined it for final reporting.

LIMITATIONS

This study has notable limitations related to the timing of the data collection, limited understanding of the survey respondents, and the brief structure of the responses. While we took measures to mitigate the impact of these limitations and believe the findings still have meaning for IR/IE despite them, we acknowledge that they overall restrict the generalizability of this research. We offer these limitations to frame our findings below.

Regarding timing, the data was collected and initially analyzed in 2023, more than 2 years before the completion of this article. This time lapse became meaningful as the federal landscape for higher education shifted after the 2024 presidential election, and IR/IE offices were faced with new challenges beginning in January 2025. These 2023 respondents and 2024 AIR participants likely did not

have the current landscape in mind when sharing perceived strengths, weaknesses, opportunities, and threats of their offices. Yet we note that, given the international reach of *The Node* and the content of some of the responses, some foreshadowing of what is currently happening at the federal level had already started to occur at the state level, so some respondents' sentiments are likely aligned with those of the current era, although they were collected 2 years ago. For the relatively few responses that do not hold relevance to the current context, we still find them valuable as point-in-time impressions that preceded the large changes of the present era. In addition, as IR/IE professionals ourselves, the authors of this article all managed the shifting landscape while engaging in this qualitative analysis. The potentially delayed timing therefore allowed us to use these foundational impressions from respondents to inform our discussion and how these findings can be applied to today.

Related to not knowing the exact context to which respondents referred when writing about their perceived strengths, weaknesses, opportunities, and threats, the anonymous nature of the survey begets a lack of individual respondent characteristics. In the Methodology section we reported on the readership of *The Node*, but we do not know exactly who responded to the SWOT poll questions. In addition, the data was collected via convenience sampling and there were only about 300 responses. Only those who happened to open the newsletter each week and had an available moment were likely those who responded, meaning we lose information from those with low bandwidth. It is also possible that those who shared their impressions were those that had strong opinions on either side—particularly satisfied or particularly dissatisfied. Because we cannot verify the representativeness of this sample, we cannot confidently say that these findings are generalizable across all IR/IE offices. Our efforts to share our findings at regional and national association meetings worked to mitigate this limitation via informal member-checking, but the individuals and offices who are afforded the opportunity to travel for professional development present a further limitation.

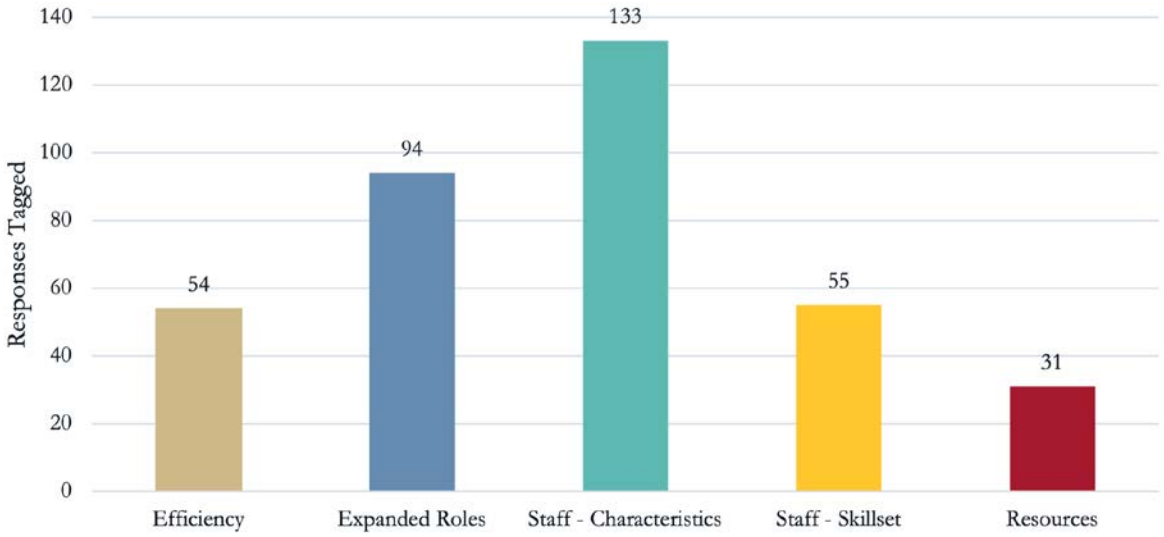
Last, the structure of the responses limited our analysis. While the longest response that was submitted was 103 words, approximately 91% of the responses (about 275 of the 302) were individual words or phrases. Only 8% of the responses (about 25 of the 302) included full sentences. This further restricted the amount of context that we could glean from these data and limited the textual richness overall. In addition, as noted in the Methodology section, we noticed that respondents did not conform to the external/internal dichotomy inherent in SWOT analysis. This means in practice that they might have shared observations about external opportunities/threats when asked about internal strengths/weaknesses or vice versa. We chose to manage these limitations with multiple rounds of analysis over the 1.5 years of our research process. We nevertheless acknowledge that our approach used basic qualitative methods and that other methodologies, such as qualitative content analysis, are options for future research. To avoid delays in addition to those mentioned in this section, we chose to close out our analysis and report on findings now in hopes that it might lay the foundation for future, more-robust research.

FINDINGS

Strengths/Opportunities

Out of the analyses described above, five themes were developed (in order of frequency): (1) Staff–Characteristics, (2) Expanded Roles, (3) Staff–Skillset, (4) Efficiency, and (5) Resources. The frequency of these themes and their corresponding codes' frequencies can be compared in Figure 3 and Figure B1 in Appendix B, respectively. Overall, the responses to *The Node*'s inquiry on strengths received the highest number of responses and the inquiry on opportunities received the lowest number of responses. Therefore, more of these themes centered on internal strengths rather than on external opportunities. Definitions for each theme and code, as well as examples of quotes for each code, can be found in Table C1 in Appendix C. Representative quotes for each theme are shown below.

Figure 3. Frequencies of Strengths/Opportunities Themes



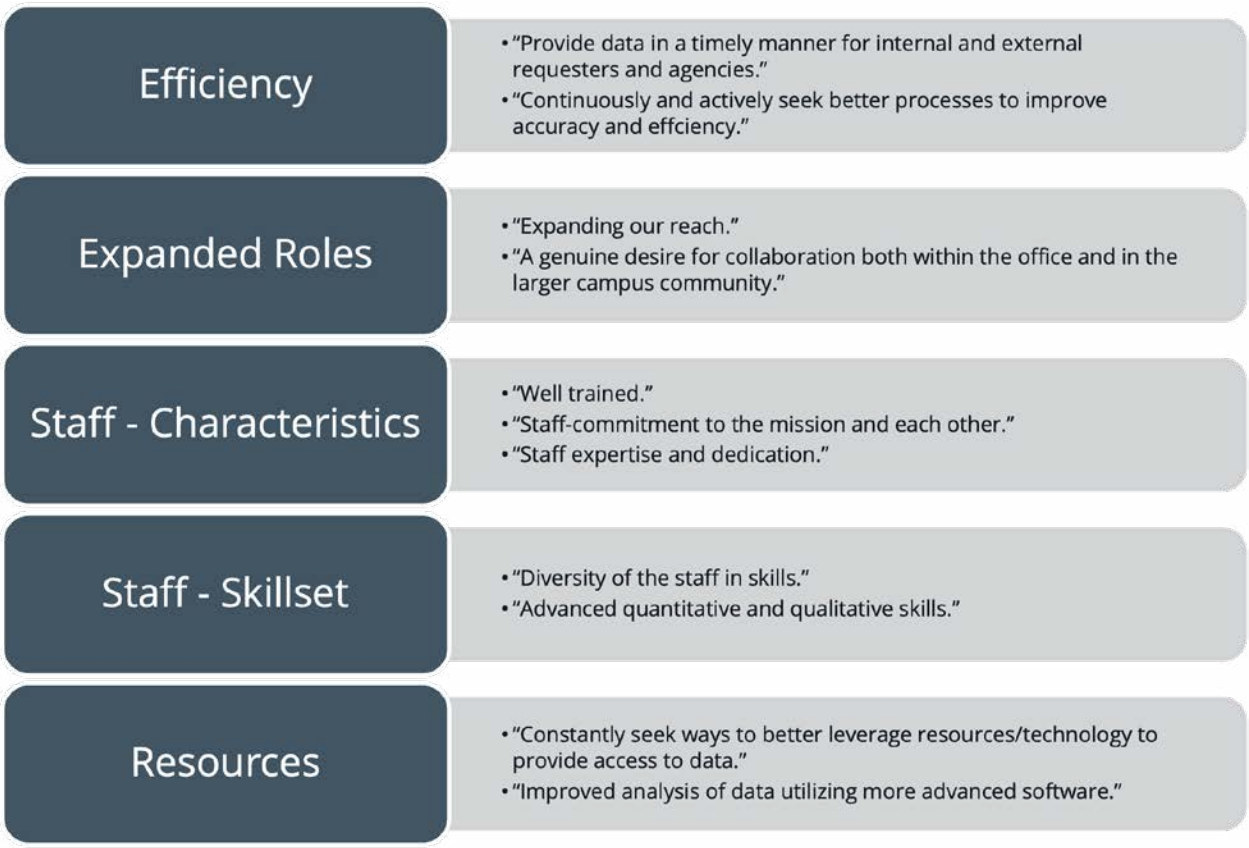
STAFF–CHARACTERISTICS

This theme includes both the largest number of responses and the largest number of individual codes underneath it of all the themes in the analysis. Across all responses, direct references to IR/IE staff's personal characteristics, individually or collectively, were common. For instance, respondents positively described team-oriented, problem-solving, customer-focused office cultures. Some specifically mentioned aptitudes such as detail orientation, strong leadership, or general work experience. While smaller in number, we noted that some respondents even took the time to describe their fellow IR/IE staff members as warm and considerate of work-life balance. These responses indicate that the skills necessary to be successful in IR are not limited to technical competency.

EXPANDED ROLES

The theme with the next-highest number of responses was Expanded Roles, which represents codes that are primarily external in nature and are centered around opportunities identified by institutional researchers. Respondents discussed how their collaboration with campus partners had moved from basic reporting to strategic decision-making, increasing their involvement in campus-wide discussions. Some respondents reported that growth in their offices occurred due to supportive campus leadership, especially from presidents and provosts who were invested in IR/IE offices. Work in data governance was also cited, such as literacy, stewardship, policies, standards, quality checking, and transparency. Finally, a minority of respondents discussed seeing the opportunity presented by external data requests such as accreditors and state-level stakeholders. These responses broadly acknowledged that the roles that IR/IE offices and their staffs are fulfilling have expanded from their compliance reporting roots. Representative quotes for each theme in strengths/opportunities are shown in Figure 4.

Figure 4. Representative Quotes for Each Theme in Strengths/Opportunities



STAFF–SKILLSET

The Staff–Skillset theme very closely followed the Expanded Roles theme in the number of responses. Like the Staff–Characteristics theme, the Staff–Skillset theme included responses focused on the people who made up the IR/IE offices. However, in contrast to the Staff–Characteristics theme, the Staff–Skillset theme included codes focused on tangible skills that could be developed via prescribed steps as well as the use of the word "skills" with no additional context. For instance, some respondents discussed the strength of their offices in their technical skills such as software proficiency or research methodology expertise. The depth of staff members' institutional knowledge and their access to professional development opportunities also featured in this theme's codes. Last, respondents described strong communication skills via effective presentations and data visualization. The responses in this theme elevated the tangible or technical skills required for successful IR/IE offices.

EFFICIENCY

Both a strength and an opportunity, the next theme is Efficiency. Some respondents listed speed, timeliness, and efficiency of completing tasks, while a few others discussed how automation could support completion of tasks. Less generically, some responses described the existence of efficient processes characterized by flexibility, proper management, and overall organizational structure. The existence of the Efficiency theme illustrates that respondents either enact or plan to invest effort in saving time in their work processes.

RESOURCES

The least prominent of all the strengths/opportunities themes was Resources. This theme included only two codes. The first was a code for technology, which stood for either generic uses of the term "technology" or explicit references to preferred software. The second code focused on explicit statements concerning access to data, either providing or having access. The existence of the Resources theme illustrates its necessity, but the lower number of responses suggests that it does not rank highly in its consideration as either a strength or an opportunity.

Overall Response to Strengths/Opportunities

As a part of this study, we presented these findings to a group of IR/IE practitioners at the AIR Forum 2024. The audience expressed general agreement with the strengths/opportunities themes presented above. Of note was the engagement around the Staff–Characteristics theme, which we pointed out to the audience for including a code for "warmth," or discussion of friendliness, enthusiasm, and approachability of members of IR/IE staff. While it could be assumed that IR/IE would attract people purely interested in the technical aspects of the work, the AIR Forum audience affirmed that those most successful in this field are those who can communicate the technicalities effectively. The role of institutional researchers is multifaceted, requiring both technical skill and the ability to strategize, communicate, organize, and manage the interpretation of data in complex, human systems.

Weaknesses/Threats

The analyses of weaknesses/threats produced five major themes (in frequency order): (1) Resources, (2) Human Resources, (3) Institution, (4) Planning,

and (5) Political/Legislative. The frequency of these themes and their corresponding codes' frequencies can be compared in Figure 5 and Figure B2 in Appendix B, respectively. Additional memoing after the AIR 2024 Forum did not lead to significant alteration of these larger themes but did lead to some movement and consolidation of smaller codes beneath them. Definitions for each theme and code, as well as code-level representative quotes, can be found in Table C2 in Appendix C. Below, the overall sentiments for each theme (in order of frequency) are discussed in the aggregate, with representative quotes for each theme in weaknesses/threats found in Figure 6.

Figure 5. Frequencies of Themes in Weaknesses/Threats

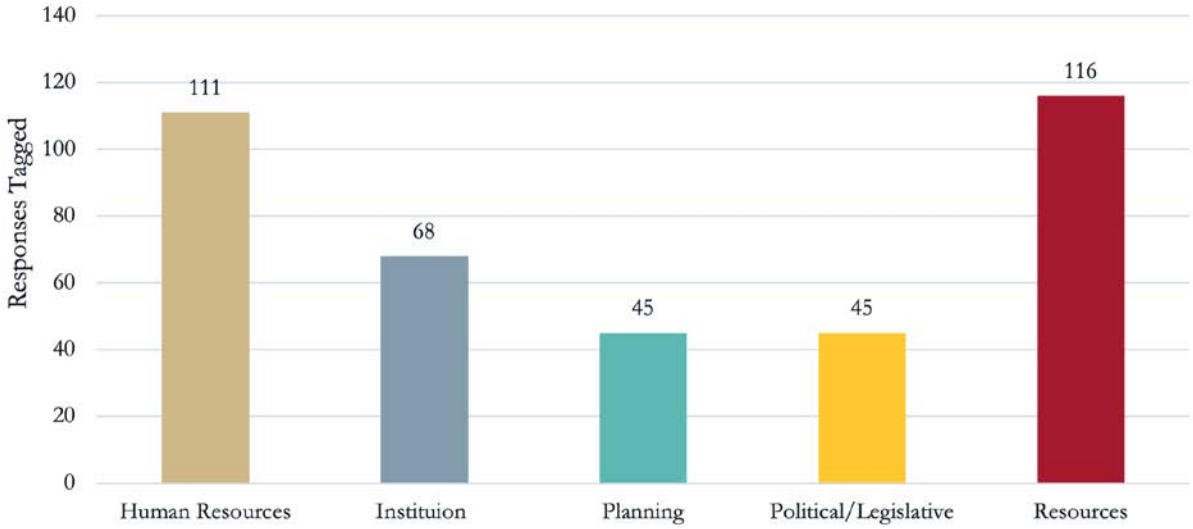
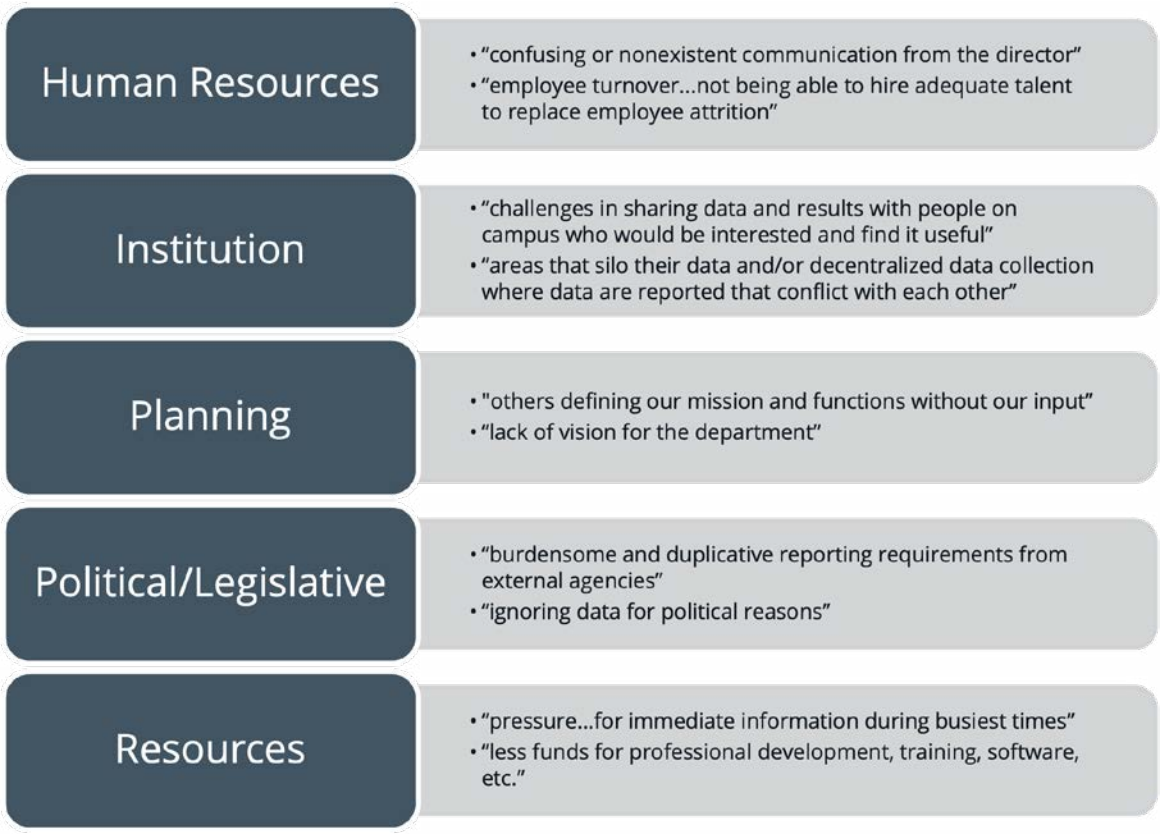


Figure 6. Representative Quotes for Each Theme in Weaknesses/Threats



RESOURCES

This theme was characterized by respondents' focus on capital, capacity, budget, skills, and other *non-human* assets that impact respondents' ability to do their work. Of note was the recurring reference to increased demand for data, data products, and insights that respondents believed did not consider the resources they had at their disposal. Respondents repeatedly mentioned the gaps between the resources they have and the expectations and goals they must meet. Additionally, lack or loss of specific tools and skills, making it more difficult or impossible for them to do their jobs or meet the demands of their requestors, was frequently stated. This theme underscores just how critical the assets supportive of IR/IE are to the work being done.

HUMAN RESOURCES

Though non-human Resources were discussed the most in weaknesses/threats, *Human* Resources came in a very close second. While there was some overlap between the theme Human Resources and the theme Resources, what made this theme distinct was the identification of issues with the administrative and office processes that characterize respondents' offices and the level of staffing they have access to. For example, what makes the "increased demand" and "capacity" codes in the Resources theme distinct from the same codes in the Human Resources theme is their focus on mismatches between expectations (of others) and reality (of what the office can do). In contrast, the Human Resources codes characterized responses reporting burnout, turnover, succession and longevity-focused practices, and general understaffing. The definition of the Human Resources theme is modeled after the classical definition of a human resources department (addressing hiring, retention, administration, and training) rather than the literal definition of a resource being human. These responses emphasize that the human element of IR/IE is distinct and valuable, and that it merits consideration.

INSTITUTION

In this theme, many respondents reported unstable or minimal practices and standards at their organizations that included them, their offices, or the data they work on. Lack of cooperation between their unit and other offices, issues with data siloing and dissemination, and broader problems with data culture all characterized this theme. Though the theme Resources addresses more broadly spoken-of gaps between expectations of other departments and reality, the Institution theme is typically centered around negative relationships or interactions with other units. Comments in this theme reiterate the importance of others on campus recognizing IR's importance to the staff in the office.

PLANNING

Some respondents discussed the need for alignment between their unit's strategy and the larger plan of their institution. These respondents reported that their units are left out of decision-making processes that contribute to broader institutional goals, have management struggles due to lack of anticipatory strategy, or are generally dissatisfied or puzzled regarding the direction or purpose of their office as it relates to the broader organization. Though named Planning, this theme also strongly referenced strategy, goals, direction, and purpose. By discussing this theme, respondents indicate that there is a need for intentionality behind the work they do and the future of their office in relation to the purpose of the institution for which they work.

POLITICAL/LEGISLATIVE

Though mentioned the least often of all the themes, a handful of respondents noted the recent uptick in regulatory requirements at both the federal and state levels. These responses addressed the impact of reporting changes and environmental budget decreases on their ability to do their jobs. Though minimally mentioned, the Political/Legislative theme indicates that broader state and federal policies do produce impacts at the IR/IE office level.

Overall Response to Weaknesses/ Threats

These themes for weaknesses/threats were generally met with agreement when the first draft of consolidated codes was presented at AIR 2024; however, of note was the significant spoken sentiment from the room in support of the Political/ Legislative theme. The response count for this theme would suggest it is one of the less-pressing weaknesses/threats that IR/IE professionals see; however, the time lapse between the collection of these responses (early 2022) and the relative recent focus on reporting and regulatory changes in this field (2024–2025) is notable. Additionally, with the recent reduction in force orders from the president that significantly downsized the U.S. Department of Education (2025), the authors find it likely that, were this study to be replicated today, this theme would appear more frequently in respondents' answers.

DISCUSSION

Meeting the Moment

Our findings on strengths/opportunities reflect the ways in which IR/IE practitioners are "meeting the moment" as the responsibilities, expectations, and structure of the field are changing. Literature has tracked the evolution of IR/IE from strictly the compliance reporting arm of institutions to a much more comprehensive data center included in decision-making, data governance, and strategy (Volkwein et al., 2012). Though various authors have recommendations for the knowledge and skills that are necessary to be successful in IR/IE (Eimers et al., 2012; Knight et al., 1999; Terenzini, 1993), the responses from strengths/opportunities provide insight from institutional researchers themselves. Staff characteristics and skills, ability to take on expanded involvement, high efficiency, and adequate resources reaffirm the frameworks suggested in literature and provide guidance rooted in practice.

In contrast, participants shared insights on "gaps" they identified while attempting to "meet the moment" through their responses to the weaknesses/threats survey items. While respondents acknowledged the high interpersonal and technical skills of their staff, collaborative working environments, and some support from campus leadership, they also reported that the height of expectations placed on their offices did not equal the resources provided to them. Notably, both non-human and human resources, such as capital and capacity, were cited as lacking or under-supported in relation to respondents' listed responsibilities. Furthermore, larger institutional data usage strategy and/or pathways to increased resources were found to be insufficient. The survey respondents often shared that they were either not included in strategy development or that there simply was not a data strategy in their offices or institutions. All these weaknesses/threats work against the solid foundation of the strengths/opportunities identified by the respondents.

Thematic Overlaps

In our synthesis of the findings, we present four ways that the strengths/opportunities and weaknesses/threats overlapped. These overlaps were shared with the AIR Forum 2024 audience and then expanded during the third analysis.

(WE NEED MORE) GREAT STAFF

A potentially novel insight from the analysis was the number of references to and the high value given for staff, the human beings who do the work of IR/IE. The greatest number of responses spoke to the characteristics of great staff who make up IR/IE offices; these responses were sometimes incredibly warm. There were positive comments about the diversity of IR/IE staff in skills, experience, interests, and approaches to work that make them great. Furthermore, respondents wrote about the professional and helpful attitudes of current IR/IE staff, the use of resources/technology to provide access, and their dedication to providing decision support. Respondents also shared insights on the lack of personnel, institutional support, and responsiveness; one respondent wrote, in triplicate, "need more bodies to do the work." Beyond indicating the need for simply hiring more individuals, respondents also provided insight into the need for professional and technical skill development for existing staff. Probable substantiations for the need for more great staff are the increased demand for data, expanded roles of the IR/IE office, and economic pressures on salaries and budgets for resources.

HIGH EFFICIENCY VS. INCREASED DEMAND

Beyond the human capital often discussed in the responses, IR/IE professionals also spoke to the technology and process efficiencies leveraged by their offices. Two potential sources of pressure to find efficiencies arose from the responses. First, there were additional reporting mandates and an increased demand for data that created interest in finding better software or data, often at lower or no cost due to resource scarcity. Second, there was an interest in providing greater data accessibility while also streamlining analytics so offices could focus on interpretation and strategy support. However, this increased demand for data and ever-expanding roles paired with a lack of supportive leadership and resources could lead to staff burnout, staff turnover, and weakened processes.

TWO SIDES OF THE SAME COIN: COLLABORATION AND DATA SILOS

Responses about campus partnerships and cooperation were relatively split in their sentiments. The largest number of responses in the "Expanded Roles" theme of strengths/opportunities pertained to the codes encapsulating collaboration around data, which were often fed by strong institutional leadership buy-in on data-informed decision-making. Centrally mentioned were positive comments about emerging partnerships with other campus units, satisfaction that data and data sharing were used in conversations about broader strategy, and mention of a top-down culture that is supportive of IR/IE inclusion. Inversely, the largest number of responses in the Institutions theme of weaknesses/threats addressed the codes about data silos and lack of collaboration. Discussed were the frustrations around not being viewed as a strategic partner, data silos producing reporting differences, and a lack of support from higher leadership. These responses indicate that, regardless of sentiment, the subject of collaboration (or lack thereof) is significant in

the minds of IR/IE practitioners as it relates to their experiences in their institutions and in the field more broadly.

IT'S COMPLICATED: THE RELATIONSHIP WITH EXTERNAL BODIES

When state or federal bodies are mentioned by respondents, they are exclusively mentioned in a negative light—even though the original function of, and still a major role for, IR/IE offices is reporting to these bodies. There were no mentions of positive support from state or federal entities. Instead, the relationship was often characterized as one-sided: our offices provide data and information, but all that those inputs provide (in the perception of our respondents) is pressure. Respondents expressed notable stress around increases in mandated reporting requirements, disagreement with how the data they report is being used in political decisions, and frustrations surrounding diminishing investment in their offices. In the current environment, we theorize that these sentiments may evolve. Though the presence of frustration may continue amidst the lack of acknowledgement by the federal executive about the importance of our work, anticipated issues with centralized reporting (particularly at the federal level) could produce positive sentiment about the few that were not subject to the recent reduction in force (U.S. Department of Education, 2025). Furthermore, as questions and issues arise at the federal level around institutional reporting, it is possible that an increased appreciation for continuity of state-level reporting could occur.

CONCLUSION

Value and Applications of This Research

The findings presented in this article have a multitude of applications, the first of which is to validate the thoughts and feelings of those in the IR/IE field regarding their offices, their positions at their institutions, and the supports and limitations they encounter in their everyday work. There is a great deal of literature that provides suggestions for IR/IE offices and their work (Gagliardi & Wellman, 2014; Knight et al., 1999; Webber, 2018); however, validating that with qualitative sentiments reaffirms that guidance and provides grounded direction to IR/IE leaders.

Along those lines, we hope this analysis serves as a resource for IR/IE leadership or institutional leadership to cite when advocating for the involvement of IR/IE in institutional decision-making, resource allocation, and the importance of the IR/IE function in postsecondary education. Particularly given the current political landscape, it is important now more than ever to have research that communicates the necessity of reporting and data collection. Parents, students, legislators, and business leaders all have questions about postsecondary return on investment, the cost of postsecondary credentials, and the populations that enroll in postsecondary institutions. It would be helpful to those stakeholders that IR/IE leadership use the findings in this article to understand how to support IR/IE staff in their endeavors to answer these questions.

Last, this research initiates and contributes to an introspective look at cross-positional IR/IE staff sentiments for others in the IR/IE field. Aside from validation of sentiments felt in the broader IR/IE

community, the efforts undertaken to take stock of and understand the status of the field have been largely organized around collection from IR/IE directors and other senior leadership. By enabling anyone in the field to respond, we hope that more positionally diverse voices are represented in this study that help supplement the submissions to surveys like the AIR National Survey of IR Offices (AIR, 2024).

Future Research

Though there are many directions in which future research on this subject could be taken, we highlight below those we believe to be most important. First, recognizing that the researcher is the analytic tool in qualitative research, we believe that different methods or software technologies applied to the same dataset could bring to light additional insights from the data. While we engaged in some basic qualitative techniques for this analysis, we believe that a robust qualitative content analysis (Flick, 2014; Grbich, 2022; Krippendorff, 2022) could glean important future insights. Though the depth of the data collected for this article is relatively limited, comparing it to insights gleaned from qualitative content analysis could be beneficial.

Second, we identified that the lack of context about SWOT in the poll questions led to a mix of items that varied widely across the impact dimension of the SWOT structure. A future study that expands the research with additional information about SWOT would likely elicit deeper insights from participants. In addition, future study could provide the opportunity for richer text data such as a greater number of words available and/or a focus group or interview methodology.

Finally, future researchers should consider collecting additional information about respondents and their institutions. Due to the anonymity of the survey in this study, we cannot be sure of respondents' positionality in their offices, the size of their offices or institutions, their years of experience in the field, or even if they identify their work as more in the IR or the IE spaces. Adding this additional context to the content of the responses would allow researchers to definitively determine whether their data and findings are representative of the field.

APPENDIX A: FIRST ANALYSIS FIGURES

Figure A1. Top Responses by Frequency: Strengths

What are the greatest Strengths of your IR/IE office?
(Most common responses in order of frequency)

Collaboration
Technical Skills
Institutional Knowledge
Integrity
Support
Efficiency
Staff
Teamwork
Communication
Professionalism
Responsiveness
Continuous Improvement
Customer Service

Figure A2. Top Responses by Frequency: Weaknesses

What are the greatest Weaknesses of your IR/IE office?
(Most common responses in order of frequency)

Understaffed
Budget/Resource Constraints
Lack of Leadership Support or IR/IE Not at Leadership Table
Time Constraints
Poor Institutional Communication
Staff Turnover
Poor IT/Data Infrastructure
Institutional Silos

Figure A3. Top Responses by Frequency: Opportunities

What are the greatest Opportunities of your IR/IE office?

(Most common responses in order of frequency)

Data Automation/Innovation
Data Literacy
Professional Development
Impact of Data on Leadership
Data Analysis
Collaboration
Growth Mindset of Staff

Figure A4. Top Responses by Frequency: Threats

What are the greatest Threats of your IR/IE office?

(Most common responses in order of frequency)

Financial Resources
Staff Turnover/Burnout/Office is Understaffed
Siloing/Misunderstanding the Role of an IR Office
Poor Data Literacy or Other Offices Not Using Data
Leadership Changes/Lack of Leadership Support
Poor Data Quality

APPENDIX B: FREQUENCY FIGURES FOR THEMATIC CODES

Figure B1. Frequencies of Strengths/Opportunities Codes Grouped by Theme

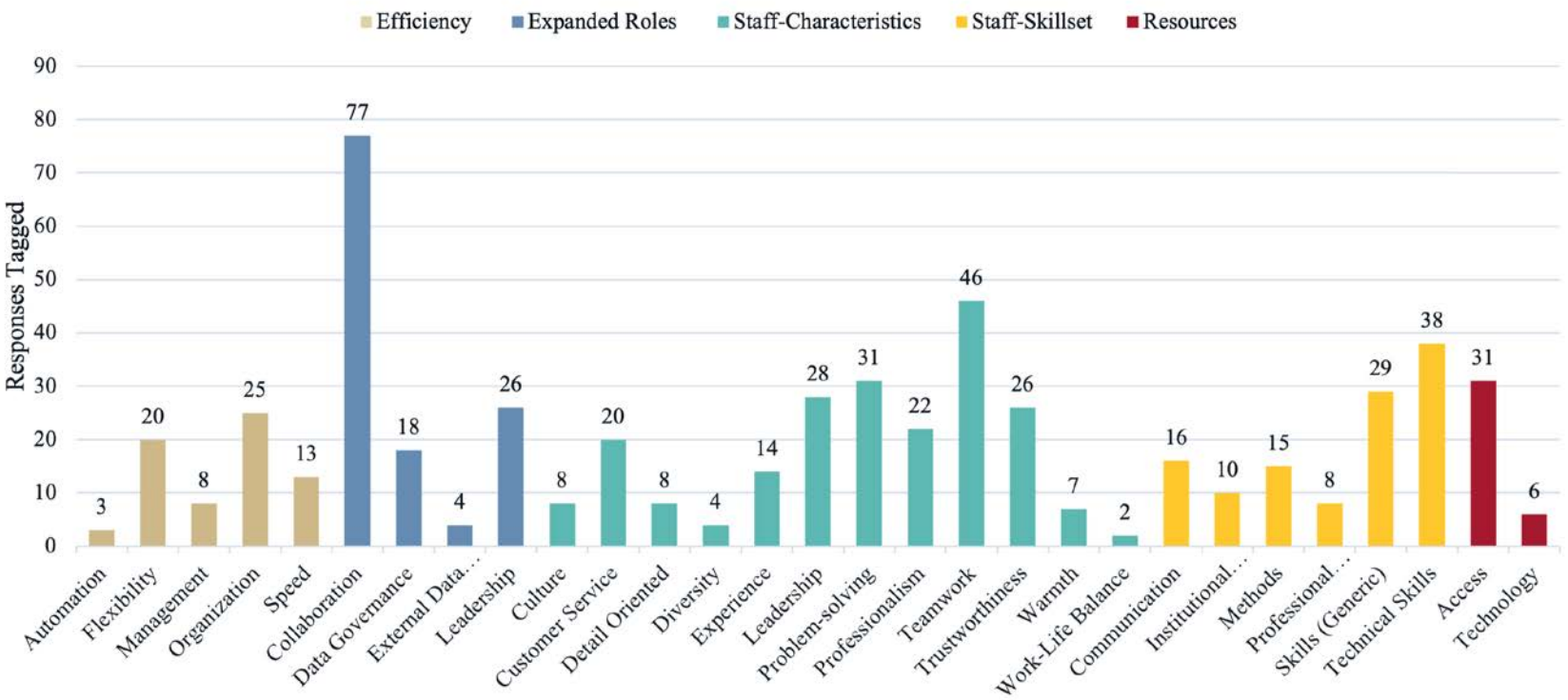
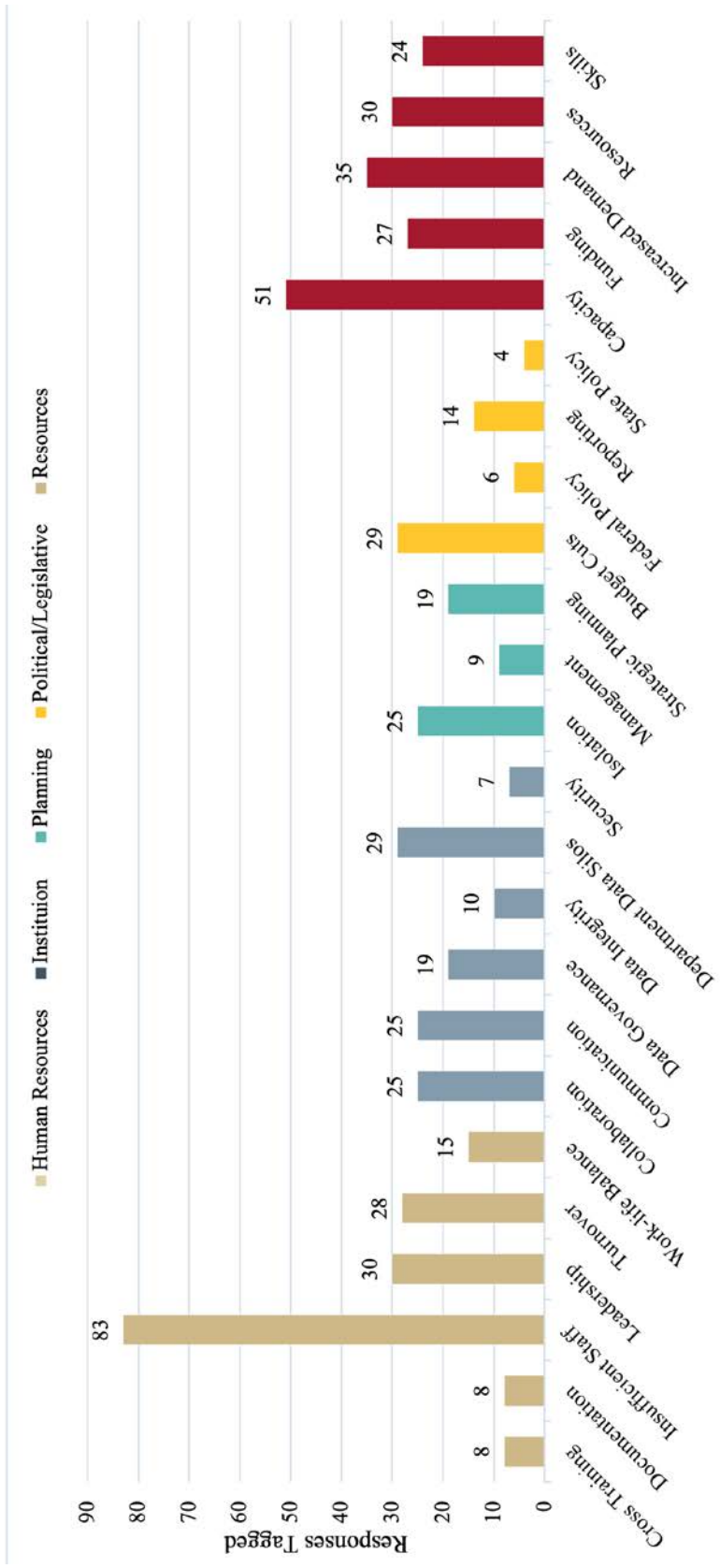


Figure B2. Frequencies of Weaknesses/Threats Codes Grouped by Theme



APPENDIX C: THEME AND CODE DEFINITIONS AND EXAMPLES

Table C1. Definitions and Examples for Strengths/Opportunities' Themes and Codes

Theme [Response Count]	Theme Definition	Code [Response Count]	Code Definition and Example(s)
Efficiency	Items focused on a collection of codes that speak to the efficiency of the IR/IE office.	Automation [3]	Related to "automation" or expounds on automation if processes for task completion. *Example: "Many mundane tasks are automated"*
		Flexibility [20]	Related to the willingness to be responsive or adapt quickly to external office or university inputs such as changes to technology or needs/ requests from campus partners. *Examples: "The office's ability to adapt to change," "The office's ability to complete work in a timely fashion," "nimble, versatile, aware of community needs"*
		Management [8]	Related to targeted efforts to improve processes, prioritize work, and/or explicit references to project management. *Examples: "Committed to process improvement," "Collaboration with IT, Project Management, Forward Thinking"*
		Organization [25]	Related to general organization and logistics strength not necessarily towards continuous improvement efforts. *Examples: "Reorganizing the office," "Organization, Accuracy, Experience"*
		Speed [13]	Related to reference to the speed, timelines, and efficiency of completing tasks. *Examples: "Speed in responding to requests," "ability to respond quickly"*

Theme [Response Count]	Theme Definition	Code [Response Count]	Code Definition and Example(s)
Expanded Roles [94]	Items focused on how the role of the IR/IE office has expanded.	Collaboration [77]	Related to references to engagement with campus partners from basic communication strategies to strategic decision-making groups. *Examples: "Collaborative efforts with other offices," "providing a broad-based view when discussing University issues (not being siloed)"*
		Data Governance [18]	Related to governance concepts including literacy, stewardship, policies, standards, quality checking, transparency, and defining of infrastructure. *Example: "Increase Institutional Data Literacy/Awareness, Mentor other Departments who are learning data visualization, Building Institutional Trust in Data"*
		External Data Requestors [4]	Related to what we understand as external to the institution data requestors such as accreditors, state-level stakeholders, and Perkins V. *Examples: "Community partnerships, Industry partnerships," "The office provides excellent service to internal and external customers"*
		Leadership [26]	Related to university leadership such as presidents, provost, etc. *Examples: "Taking on larger leadership role in decision making," "influence the strategic direction of the university"*

Theme [Response Count]	Theme Definition	Code [Response Count]	Code Definition and Example(s)
Staff–Characteristics [133]	Feedback & Communication Course Engagement Critical Thinking Development Financial Support Parental Influence	Culture [27]	Related to mentalities, approaches, and attitudes of staff who work in the IR/IE office. *Examples: "Collaborative work environment," "Small size of university makes it easier to know and develop relationships"*
		Customer Service [20]	This is related to framing the role of the IR/IE office as a service provider generally and its commitment to quality, prompt, and helpful support. *Examples: "Service quality," "dedicated to being decision-support service providers to institutional colleagues," "Service Excellence"*
		Detail Oriented [8]	Related to references to "accuracy" as well as attention to detail and thoroughness. *Examples: "Prioritizes data integrity and accuracy," "Attention to detail"*
		Diversity [4]	Related to the term "diversity" in general and specific. *Examples: "Diversity of the staff in skills, experience, interests, approaches to work," "Diverse staff backgrounds"*
		Experience [14]	Related to staff experience and/or longevity. *Examples: "Staff longevity," "experienced staff"*
		Leadership [28]	Related to university leadership such as presidents, provost, etc. *Examples: "Taking on larger leadership role in decision making," "influence the strategic direction of the university"*
		Problem-solving [31]	Related to in-office skill or mindset related to solving problems including interest in learning and improvement. *Examples: "Eagerness to Learn," "creativity, problem solving," "innate curiosity, willingness to be wrong"*
		Professionalism [22]	Related to in-office skill or mindset related to solving problems including interest in learning and improvement. *Examples: "Eagerness to Learn," "creativity, problem solving," "innate curiosity, willingness to be wrong"*
		Teamwork [46]	Related to internal office relationships such as referring to one's "team" or "teamwork," collegiality, and camaraderie. *Examples: "Team mentality," "Cohesive division," "Team Player," "collegiality"*
		Trustworthiness [26]	Related to a value for trustworthiness, including trust-building, loyalty, transparency, honesty, and practicing with integrity. *Examples: "Building Institutional Trust in Data," "trust/integrity, dependability," "campus wide trust"*
		Warmth [7]	Related to the approachability, warmth, enthusiasm, and overall friendliness of the IR/IE staff. *Examples: "Genuine care," "friendly when helping others," "Approachability," "kindness"*
		Work-life-balance [2]	Related to working remotely and balance with personal lives. *Example: "Working from home"*

Theme [Response Count]	Theme Definition	Code [Response Count]	Code Definition and Example(s)
Staff-Skillset [55]	Items focused on the specific skill leveraged in an IR/IE offices work and/or discusses how those skills were developed.	Communication [16]	Related to IR/IE office's skill in communicating information through effective presentations of data visualizations. *Examples: "Visualization skills," "Data presentation using stakeholder friendly software, data analysis, forecasting"*
		Institutional Knowledge [10]	Related to understanding higher education and/or institutional context. *Examples: "Historical knowledge of the college," "broad institutional knowledge across many functional areas & 25 years of employment at institution"*
		Methods [15]	Related to the IR/IE office's skill in leveraging a range of research methods from traditional and program evaluation methods. *Examples: "Statistical knowledge, technical skill," "providing predictive analytics," "code reviews," "data mining and artificial intelligence"*
		Professional Development [8]	Related to efforts to enhance skills via conference attendance, trainings, professional learning communities, and within-office documentation. *Examples: "Opportunities to collaborate, training, conferences," "bite-size data training for campus users," "cross-training"*
		Skills (generic) [29]	Related to IR/IE office's generic "skills" or "talents" including reported excellence in foundational IR/IE functionalities of analytics and reporting. *Examples: "Increase team members' skills," "good mix of skill sets"*
		Technical skills [38]	Related to the technical skills both with software as well as research methodologies. *Examples: "Leveraging technology for routine tasks," "opportunity to learn new technologies, such as visualization tools, data mining and artificial intelligence"*

Theme [Response Count]	Theme Definition	Code [Response Count]	Code Definition and Example(s)
Resources [31]	Items focused on the materials that are used to do IR/IE work.	Access [6]	Related to explicit references to providing or having access to data. *Example: "Access to lots of data"*
		Technology [8]	Related to specific technology/software that are preferred and leveraged in IR/IE work. *Examples: "Adoption of new Tech Advances," "Improved analysis of data utilizing more advanced software"*

Table C2. Definitions and Examples for Weaknesses/Threats' Themes and Codes

Theme [Response Count]	Theme Definition	Code [Response Count]	Code Definition and Example(s)
Human Resources [111]	Items focused on the staffing, Office Processes and administration, and skill availability of the IR/IE unit.	Cross Training [8]	Related to "automation" or expounds on automation if processes for task completion. *Example: "Many mundane tasks are automated"*
		Documentation [8]	Related to the willingness to be responsive or adapt quickly to external office or university inputs such as changes to technology or needs/ requests from campus partners. *Examples: "The office's ability to adapt to change," "The office's ability to complete work in a timely fashion," "nimble, versatile, aware of community needs"*
		Insufficient Staff [83]	Related to targeted efforts to improve processes, prioritize work, and/or explicit references to project management. *Examples: "Committed to process improvement," "Collaboration with IT, Project Management, Forward Thinking"*
		Leadership [30]	Related to general organization and logistics strength not necessarily towards continuous improvement efforts. *Examples: "Reorganizing the office," "Organization, Accuracy, Experience"*
		Turnover [28]	Related to reference to the speed, timelines, and efficiency of completing tasks. *Examples: "Speed in responding to requests," "ability to respond quickly"*
		Work-life Balance [15]	Related to burnout, workload, and uneven ratios of work hours to work expectations. *Examples: "Continual workloads increase," "burnout/poor work-life balance habits"*

Theme [Response Count]	Theme Definition	Code [Response Count]	Code Definition and Example(s)
Institution [68]	Items focused on the practices and standards of the college, university, or organizations at which the respondent works.	Collaboration [25]	Related to the cooperative work between the IR/IE unit and other offices on campus. *Example: "Not viewed as a strategic partner by other departments on campus"*
		Communication [25]	Related to dissemination or sharing of data or information on campus. *Example: "Challenges in sharing data and results with people on campus who would be interested and find it useful"*
		Data Governance [19]	Related to data culture, literacy, management, warehousing, and support on campus. *Example: "Data silos/lack of data governance, low level of data literacy"*
		Data Integrity [10]	Related to the accuracy and consistency of data on and across campus. *Examples: "Unnoticed manual data entry errors," "inaccurate data entered by other offices"*
		Department Data Silos [29]	Related to isolation of data within campus units. *Example: "Areas that silo their data and/or decentralized data collection where data are reported that conflict with each other"*
		Security [7]	Related to privacy and safety of data collected on campus. *Examples: "Data security, cybersecurity," "abiding by security concerns"*

Theme [Response Count]	Theme Definition	Code [Response Count]	Code Definition and Example(s)
Planning [45]	Items focused on organizational strategy, unit preparation, and congruence between the two	Isolation [25]	Related to IR/IE unit exclusion or disregard in campus planning or decision-making activities. *Examples: "Others defining our mission and functions without our input," "no voice at the table"*
		Management [9]	Related to time allocation and efficiency as a result of pre-planning or lack thereof. *Examples: "Backlog of data needs," "unproductive meetings"*
		Strategic Planning [19]	Related to vision, direction, goals, priorities, and mission at the unit or campus level. *Examples: "Lack of vision for the department," "inconsistency in direction of the office"*
Political/ Legislative [45]	Items focused on impact of policy or law from a government or accrediting body	Budget Cuts [29]	Related to limits to funding allocation and budget decreases imposed by a government or accrediting body. *Example: "Unfunded mandates"*
		Federal Policy [6]	Related to national government policy or law that impacts IR/IE office operations. *Examples: "Changes to regulations," "ignoring data for political reasons"*
		Reporting [14]	Related to required data submission by IR/IE offices or accrediting body. *Examples: "Additional government reporting mandates," "burdensome and duplicative reporting requirements from external agencies"*
		State Policy [4]	Related to state government policy or law that impacts IR/IE office operations. *Example: "State politics"*

Theme [Response Count]	Theme Definition	Code [Response Count]	Code Definition and Example(s)
Resources [88]	Items focused on capital, capacity, budget, skills, and other assets.	Capacity [51]	Related to performance and capability to complete expected projects or tasks given constraints. *Examples: "Pressure . . . for immediate information during busiest times," "increasing requests for data with not enough resources"*
		Funding [27]	Related to funding allocation by the college, university, or organization at which the respondent works. *Example: "Less funds for professional development, training, software, etc."*
		Increased Demand [35]	Related to growth in needs or desires by those outside the IR/IE unit for work or performance by the unit. *Example: "Increasing number of data requests from [organization]"*
		Resources [30]	Related to technical or practical tools associated with IR/IE work. *Examples: "Loss of reporting tools," "major changes in software/systems with little notice"*
		Skills [24]	Related to skillsets or knowledge of IR/IE unit staff. *Examples: "Lack of skill sets related to . . . visualization," "over reliance on descriptive statistics," "programming skills (e.g. SQL)"*

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Association for Institutional Research
Christine M. Keller, Executive Director and CEO
www.airweb.org
ISSN 2155-7535

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