Advancing from Prediction to Prescription: Strategies for Proactively and Thoughtfully Addressing Students' Needs

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Abstract

Data-informed decision-making is no longer an optional or occasional practice, as higher education professionals now routinely respond to calls for accountability by providing data to show how their work impacts students. Institutions are operating with a culture that, at a minimum, includes the use of descriptive and diagnostic analyses to assess how students have performed, as well as real-time analyses to monitor current progress. Such regular data use provides a foundation for more advanced examinations to predict student outcomes, and those forecasts will ultimately inform the prescription of specific interventions to help students succeed. However, prescribed solutions are only effective when delivered with appropriate levels of care and consideration of students' needs and perspectives. In this essay, I describe the challenges and opportunities of advancing from prediction to prescription and I present four tactics for how professionals can do so with student-centered approaches.

Keywords: prediction, prescription, advising, data-informed decisions

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As higher education institutions commit to delivering high-quality experiences for students, it is becoming increasingly essential for professionals to ensure that such experiences are provided efficiently and effectively. Administrators, faculty, and staff are striving to find the most precise combinations of resources to help students reach their goals. As a result, it is now commonplace for stakeholders across an institution to leverage data to make important decisions, and Gagliardi (2018) states that these professionals see the potential for using data to transform their campus environments. Institutions typically use predictive models to understand details about students and inform strategic enrollment management, which includes recruitment and retention efforts (Gilstrap, 2020). These models, which are constructed with several years of historical data on students' performance, can help professionals identify students who could benefit from additional resources. As shown in Figure 1, most institutions are making a major or minor investment in predictive analyses (Parnell et al., 2018).

Research suggests that the use of predictive models can be a useful approach for determining which students to prioritize (Hall et al., 2021; Susnjak et al., 2022; Yu et al., 2020). Institutions are now refining their student success approaches even more by moving from using data to predict which students need assistance to using data to also prescribe specific interventions (Chen & Upah, 2018; Thompson et al., 2018). This essay describes key considerations for institutions that are advancing from prediction to prescription, with a focus on how professionals can deliver timely data-informed interventions in ways that affirm and value students' unique characteristics, abilities, and experiences.

Figure 1. Institutions' Investment in Data and Analytics
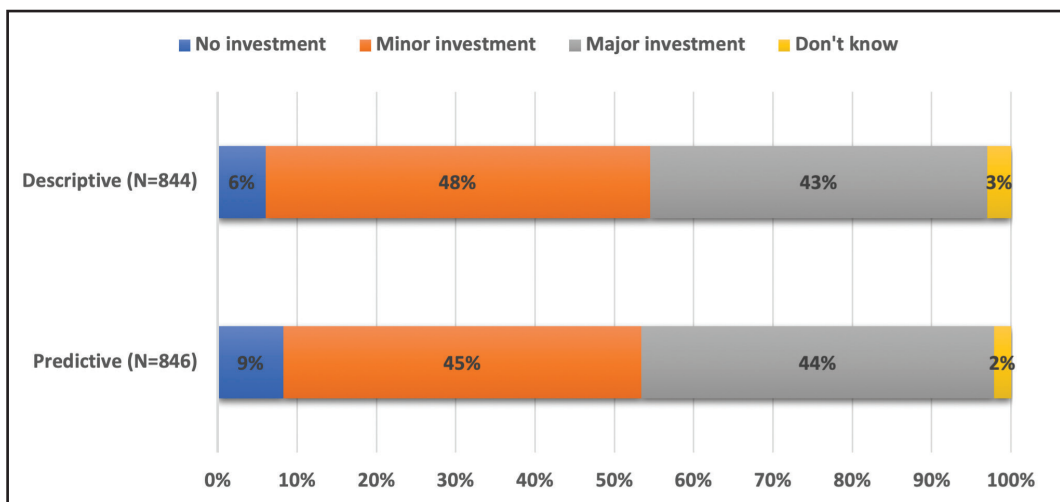
Source: Parnell et al. (2018).

Challenges and Opportunities of Data-Informed Strategies

As institutions move toward prescribing more specific resources for students, the resulting opportunities for innovation will also illuminate existing challenges. It is likely that institutions of all sizes and sectors are governed and managed, to some degree, with multiple expectations of high performance, especially regarding the delivery of the curriculum and co-curriculum. The plethora of new literature about data use, and countless data-related professional development offerings regarding literacy, privacy, and ethics indicate that for the foreseeable future, professionals will be required to regularly make data-informed decisions. Such continual use of data has the potential to contribute to a culture of prioritizing evidence in ways that are at best, positive and collaborative, or at worst, competitive and political. The following opportunities and challenges associated with stewarding an institution's resources are especially relevant when discussed from data-informed perspectives.

Managing Routines and Innovation

Parnell et al. (2018) conducted a national landscape analysis of how institutions use data and analytics for student success and found that 96% use data for a goal of improving student outcomes from interventions; 71% use data to deliver programs or services more efficiently; and 39% use data to eliminate or reduce programs that do not show a significant contribution to student success. These goals expose a challenge related to managing routine efforts and innovation, as current commitments to resources may impede the progress of future investments. As a result, senior-level administrators, faculty, and staff may struggle to discern how to analyze data to both improve existing resources and identify new strategies to pursue.

Examples of student-focused strategies that blend routine practices with innovation include the growing prevalence of digital comprehensive learner records (CLR) and assessments of prior learning. CLRs expand traditional transcripts to include evidence of students' attainment of skills and competencies inside and outside of the classroom, and prior learning assessments provide opportunities for students to receive college credit for skills acquired in work environments (American Association of Collegiate Registrars and Admissions Officers, 2021; Council for Adult and Experiential Learning, 2020). Both comprehensive learner records and prior learning assessment can be prescribed and provided via existing offices and both resources create new ways for students to receive official recognition of the depth and breadth of their abilities.

Navigating Crisis Management and Change Management

Lane (2015) asserts that although higher education is often criticized as an industry that is slow to change, institutions have endured for centuries because of their ability to both separate from and respond to changing economic, political, and social demands. Institutions do not operate in isolation from local, state, national, and even

global events, and it can be exceptionally difficult for professionals to balance current and future priorities when the speed of their institution's operations constantly adjusts to accommodate myriad external developments. Despite critiques of higher education's pace, institutions have not been completely stagnant in recent years, and the COVID-19 pandemic shows the challenge of concurrently making slow and swift decisions, as crises require quick action, and such actions can have long-term impacts on an institutions' resources.

Any efforts to manage crises or enact changes must consider students' perspectives, as Museus et al. (2017) argue that there are contextual variables that can influence how students experience campus environments and ultimately their sense of belonging. The persistent existence of inequities in higher education is at crisis level and confirms the need for data that convince senior leaders and other pivotal decisionmakers to more deliberately allocate resources to underserved students. Perhaps the most persuasive rationale for professionals to use data to manage crises and make changes is that doing so pushes the institution to holistically support vulnerable students, racially marginalized and minoritized students, and students from low-income backgrounds.

Balancing Privacy and Proactivity

McNair et al. (2016) argue that institutions should have a goal of being ready for students upon their arrival, rather than expecting students to be ready for college. Student-centered approaches are ideal for executing data-informed strategies because of the many ways in which institutions can gather details regarding students' engagement, behaviors, and progress. Miller and Bell (2016) state that the goal of analyzing student data should be to apply it to positively influence student success. However, if not managed intentionally, these analyses can negatively impact students' experiences. The efficacy of prescribed interventions is influenced by the timing at which resources are offered to students. This creates a tension, as the opportunity to provide just-in-time support may lead to professionals leveraging confidential data inappropriately.

Borgman (2018) describes a common situation of encouraging innovation while protecting against actions that invade students' privacy. Data governance policies can help institutions comply with the Family Educational Rights and Privacy Act and Health Insurance Portability and Accountability Act, but these regulations do not fully safeguard against the misuse of algorithms that monitor students' actions or the resulting interpretation of data patterns. Such patterns inform the development of interventions to reach students at the perceived most optimal times. For example, institutions can use location tracking data and course data to nudge a student who is underperforming in a course to visit a tutoring center while physically present on the campus. Such prescribed interventions, while timely, could also create a culture of surveillance and make students uncomfortable.

Delivering Macro and Micro Solutions

One hindrance of both predictive and prescriptive efforts is capacity issues, as there may be more students in need than there are resources available. For example, there is ample research to prove the importance of students feeling a sense of belonging in college environments (Barry et al., 2021; Hotchkins et al., 2021; Hurtado & Carter, 1997; Nguyen & Herron, 2021; Strayhorn, 2008) and scholars confirm that personalized experiences such as orientation and advising are highly impactful on students' connection to their institution. Those who successfully manage these resources could want to prescribe tailored services for all students but find it financially unfeasible, thus requiring them to inevitably consult analyses to determine the ideal level of prescription for each student.

Tactics for Advancing from Prediction to Prescription

Parnell (2021) developed the Data Identity Framework to explain six core abilities that every higher education professional, regardless of their role, will need to consider when making data-informed decisions. One such competency is the ability to formulate clear questions because data analyses are investments and need to connect to relevant purposes. Lane (2018) states that five types of analyses are available to policymakers: descriptive, diagnostic, real-time, predictive, and prescriptive. Higher education professionals, like policymakers, are engaged in a cycle of inquiry that starts with examining the past through descriptive and diagnostic questions that address what happened, followed by real-time questions that focus on current progress. Those efforts lead to predictive questions about what to expect in the future and prescriptive questions to identify actions regarding the anticipated outcomes. Table 1 displays key questions and actions related to each phase of inquiry.

Institutions that cultivate a culture of inquiry can facilitate a continuous cycle of examining data, sharing results, and deploying resources. This is essential, as the success or failure of sophisticated data models is impacted by the stability of the relationships, communication channels, policies, and procedures through which prescribed instruction, programs, and services will be delivered. The following four tactics describe how professionals can thoughtfully move from prediction to prescription to address students' needs.

Table 1. Analyses That Are Available to Policymakers

Type of Analysis	Descriptive	Diagnostic	Real-Time	Predictive	Prescriptive
Action	Reporting	Analysis	Monitoring	Forecasting	Impact
Key Question	What happened?	Why did it happen?	What is happening?	What will happen?	What should be done?

Adaptation from Lane (2018).

Prioritize Integrated Solutions

Students often simultaneously manage their academic, financial, social, and well-being needs, and it can be difficult for them to balance competing priorities. As a result, prescribed solutions should be highly integrated to cover the intersections of their needs. Advising is an example resource that institutions are delivering with prescriptive inventions such as "nudges" and early alerts that leverage integrated data to positively influence students' progress in multiple areas. Nixon (2022) states that through holistic advising approaches, advisors can serve as change agents in their institutions and remove barriers to student success. The Advising Success Network (2022) adds that advising encompasses not only student interactions but also structures and operations of academic advising, roles and responsibilities of primary-role and faculty advisors, and advising pedagogies and models.

Karp and Stacey (2013) and Kalamkarian et al. (2018) presented the SSIPP framework, which is structured around five principles that can positively impact students' advising experiences. These principles state that advising should be sustained, strategic, integrated, proactive, and personalized (SSIPP). The SSIPP principles, though developed for advising, should also be applied to other student-centered interventions because of the strong emphasis on collaboration among faculty, staff, and administrators, which is integral to prioritizing integrated solutions. Assessments of every prescribed intervention should address the extent to which it can reduce burdens of accessibility and complexity.

Audit Communication Strategies

Acosta (2020) states that effective communication can help students follow through with their intentions and goals. For example, practitioners who prescribe tailored resources to students must be careful to inform them about their eligibility in ways that do not marginalize them but instead affirm their abilities and encourage participation. Communication strategies are a clear indicator of an institution's mission, as such elements as tone, clarity, and language signal how students are prioritized and served. As more students also engage with their campus virtually, many will receive and request information asynchronously, which highlights the importance of students not being inundated with uncoordinated emails, texts, and other notifications.

Gathering students' feedback about their experiences is essential because despite the utility of predictive models, interventions that are informed by these algorithms still have the potential to inadequately meet their needs. If students share that they received insufficient services, it is essential for practitioners to clearly explain how the input will be used to make improvements. For example, NASPA—Student Affairs Administrators in Higher Education (2022) suggests that when delivering virtual or hybrid support to students, professionals should establish processes that allow students to quickly report concerns, questions, and feedback with a goal of resolving issues with minimal delays. Regular audits of communication strategies will reveal opportunities for professionals

to maintain a positive rapport, which could significantly impact students' persistence with prescribed solutions.

Consider Students as Decision Makers

At the core of a prescribed solution is the expectation that the student will participate. This fact requires professionals to acknowledge students as decision makers about their learning. As mentioned earlier, students are responsible for making multiple choices to meet many objectives. Their choices must be supported by comprehensive and inclusive governance structures, and Brown and Klein (2020) suggest that institutions can move toward inclusion by providing data producers, such as students, the opportunity to understand and have control over their level of engagement with data systems. In practice, this means that in addition to gathering information from students via surveys, focus groups, and interviews, it is important for professionals to share the results of studies with students to help them make their own data-informed decisions.

Part of students' process to determine their personal and professional goals involves them selecting a path that fits their career, financial, and academic aspirations. As mentioned earlier, these competing priorities require integrated approaches and Bailey et al. (2015) state that mandatory student success courses, well-designed online information, and career counseling can help students select a program of study. However, prescribed actions for students' success must be framed with expectations of students as partners who are as invested in their progress as the professionals who support them. Such partnership requires senior leaders to create an institutional culture that encourages students to advocate for their needs and challenge systems that do not support their growth and development. Such an environment helps students choose educational paths that are stable, sustainable, and responsive.

Scrutinize Processes and Policies

It is now more critical than ever for institutions to progress from using data to identify inequities to using data to inform and spur the bold and necessary changes to help all students excel. The emphasis on action must be complemented with interrogation of the structures through which interventions operate. To do this effectively, it is important for administrators, faculty, and staff to examine the methods that support or prevent their prescribed actions. When professionals consult disaggregated data and predictive analyses to prescribe action, it is vital to also determine whether the existing campus systems can support and maintain those interventions. Doing so prevents a well-designed and timely resource from being hindered by poorly constructed policies and procedures.

For example, should the director of student success determine the ideal range of tutoring hours for part-time students who are at risk of not reaching satisfactory academic progress, the next step would be to prescribe tutoring to students who are identified as needing it. To address how part-time students would navigate the experience, the

director would need to pursue flexibility in components such as hours of availability, delivery methods, and location. Other policies that can hinder students' progress include requirements to pay nominal fees before being allowed to access services or register for courses. The student-ready design referenced earlier requires tedious examination of how students receive interventions because the investment, for both the institution and learner, is too expensive to not handle thoroughly.

Conclusion

As professionals use data to prescribe, deliver, and measure the impact of programs and services, they will continually deal with multiple challenges and opportunities related to timing, scale, change management, and other issues. Perhaps it is because a perfect, all-encompassing definition of student success is elusive, as one learner's opinion of an optimal experience can vary significantly from their peers' perspectives. Equally as varied are the settings in which successful efforts can occur as institutions provide a mix of fully virtual, hybrid, and in-person engagements. Despite these conditions, it is urgent that professionals collaboratively and holistically address the persistent inequities that preclude students from receiving the positive and valuable college experiences that they deserve.

EDUCAUSE (2022) examined a variety of social, technological, economic, environmental, and political trends related to data use in higher education and asserted that staff will need more data literacy training and resources in the future. While such preparation should address appropriate uses of artificial intelligence and privacy considerations, training on effective communication and integrated design are equally important. It is essential for algorithms to be paired with human decision-making, as professionals' ability to help students succeed often involves welcoming and affirming interactions, and that is arguably the most important factor in advancing from prediction to prescription now and for years to come.

Author Note

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