# Graduation Project: Using Student Progress Tracking Analytics to Improve Graduation Rates

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# The Graduation Project: Leveraging Data-Driven Interventions to Support Near Completers

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## Abstract

In higher education, graduation rates have become a fundamental measure responsible for shaping institutional accountability, professional reputation, accreditation, and the ability to secure funding. These rates also have a broader socioeconomic implication as they impact an individual's potential financial stability, as well as strengthen the general labor market by providing an influx of qualified professionals. However, many students fail to achieve graduation in a timely manner due to a multitude of factors that extend beyond repeating courses or poor academic performance. Although changes in curriculum and program requirements often require significant time to design and implement, this study adopts a more student-focused approach to provide immediate interventions aimed at supporting successful student outcomes. Recognizing the importance of timely graduation, this study aims to explore strategies to increase graduation rates by 5% during the current academic year. It focuses on identifying and supporting 'near completers', students who, while slightly behind, need only a few additional credits to graduate at the end of the year. Using progress analytics, the study identified near-completers as those who have completed 70% or more of their degree requirements prior to the start of the current academic year. By analyzing factors such as degree progress, credit utilization, and barriers to completion, the study examines how targeted interventions can address common challenges faced by these students. Mid-year evaluations conducted after the fall semester reassess student progress and inform refinements to spring enrollment plans, such as adding critical courses or substituting credits to facilitate degree completion. Collaboration with academic deans, advisors, and student success teams is key to im-

plementing these adjustments, allowing the study to explore the dynamic and responsive nature of these interventions. The strategic use of financial resources is also being analyzed to understand its impact on supporting students with modest but critical needs. This iterative approach provides opportunities to measure the short-term effectiveness of interventions while generating insights into long-term strategies to improve retention and graduation rates. As the study progresses, it examines the broader implications of focusing on near-completers, including the potential for scalable models that other institutions can adopt. By integrating progress analytics and cross-departmental collaboration with a student-centered focus, this research aims to contribute to understanding how data-driven, targeted interventions can enhance institutional performance and student success. The emphasis on near-completers offers valuable insights into identifying students at a critical juncture in their academic journey and providing tailored support to ensure their transition from at-risk to successful graduates. Although the study is ongoing, early findings suggest that such approaches not only address immediate goals but also align with the broader mission of fostering individual achievement and long-term success, highlighting the potential of focused intervention strategies.

Keywords: progress analytics, student success, student outcomes, learning analytics, program curriculum, graduation rates, educational data mining

## Introduction

While the number of students successfully completing their degrees has steadily increased since the beginning of the century,[1] many students face new challenges that reflect a growing array of academic, financial, and personal obstacles.[2] The traditional graduation timeline often proves difficult to achieve due to factors such as credit misalignment, insufficient support systems, financial hardships, and competing personal responsibilities. For many students, these challenges compound over time, creating barriers to degree completion that extend well beyond academic performance.[3] Addressing these issues is crucial not only for ensuring student success, but also for improving institutional effectiveness and societal outcomes.

Even small increases in graduation rates can have significant benefits for students, universities, and society at large. For students, completing a degree on time reduces the financial burden of extended tuition payments and minimizes student loan debt, improving their long-term economic stability. Upon graduation, students can also enter the workforce earlier, contributing to their career advancement and earning potential. For universities, higher graduation rates enhance institutional reputation, improve performance metrics, and secure funding opportunities, particularly as graduation rates are increasingly tied to accountability and resource allocation frameworks.[4] At the societal level, timely graduations strengthen the labor market by supplying qualified professionals who can meet the demands of the workforce, drive innovation, and support economic growth.[5] Understanding these broad benefits, this study focuses on addressing barriers to timely graduation by identifying and supporting students who are close to completing their degrees but face challenges in crossing the finish line. By targeting this critical population, institutions can make meaningful progress toward improving student outcomes, enhancing operational performance, and contributing to the long-term well-being of individuals and communities. This research underscores the transformative potential of even modest improvements in graduation rates, demonstrating how focused, data-driven strategies can create significant ripple effects across higher education and

beyond.

## Graduation Rates

Graduation rates serve as a key indicator of student outcomes and as a measurable benchmark of institutional effectiveness, accountability, and socioeconomic impact. These rates have become a foundation for discussions about higher education accountability, offering a quantifiable measure of how well institutions retain and graduate students.[6] These rates provide a more holistic understanding of institutional effectiveness when combined with other data enabling policymakers, educators, and the public to evaluate how effectively institutions meet their educational missions.[7] Furthermore, graduation rates significantly influence institutional reputation and ranking, which have become central to how universities are evaluated and compared. Rankings, such as those published by U.S. News and World Report, have institutionalized the concept of performance as a proxy for quality and excellence.[8] These rankings, which are heavily weighted by graduation rates, have the power to shape public perceptions and policy discourse around university performance. As rankings proliferate societal thinking, they increasingly inform decisions about funding, enrollment, and institutional strategy, further embedding graduation rates as a critical measure of success.

Beyond institutional metrics, graduation rates have direct implications for workforce readiness and economic contributions. With bachelor's degrees increasingly required for a significant portion of jobs, timely graduations ensure a steady supply of qualified professionals to meet labor market demands.[9] Employers widely recognize the value of college degrees, further reinforcing the importance of graduation rates as a measure of how well universities prepare students for professional success .[10] In addition, high graduation rates are correlated with reduced student debt burdens and improved financial stability, making them an essential indicator of individual and societal economic health.[11,12] Given their broad implications, graduation rates not only reflect an institution's ability to deliver on its promises of academic success but also highlight areas where targeted interventions, such as those explored in this study, can make a meaningful difference in achieving positive student outcomes. The goal of this study is to improve this vital metric, ultimately benefiting both the institution and the larger community.

## Progress Analytics

Data analytics has become an essential tool in supporting student success. Higher education institutions have learned much from the business analytics community and have worked to create their own data platforms in support of institutional analytics.[13–17] The ability to track student progress is essential in designing targeted interventions to improve student outcomes.[18] Prior research identified the need for a learning analytics platform capable of providing a comprehensive view of student progress, with a critical focus on satisfying degree requirements rather than merely accumulating credit hours.[16] This type of requirement is a key aspect relative to specific graduation milestones, such as the traditionally recognized four-, five-, or six-year degree completion timelines. Student progress can be categorized as ahead of schedule, on track, or behind schedule based on their progress of satisfying degree requirements in relation to these milestones. For example, consider a student with an admit term of Fall 2022 who has completed 100 credit hours. When

analyzing their credit hours for applicability toward their degree requirements, we find that only 81 credits can be used to satisfy their degree requirements. If we evaluate their progress over six semesters, including their current enrollment and 81 applicable credits toward a degree requiring 120 credit hours, they would be classified as ”Behind” for a four-year graduation. This classification is based on the expectation that a student should have at least 84 applicable credits by the end of six semesters to remain on track for a four-year timeline. However, this same student would be classified as ”Ahead” for a five- or six-year graduation trajectory. Since grades are earned on a term-by-term basis, this type of analysis requires term-level granularity and assumes students are making steady, uniform progress across each term.

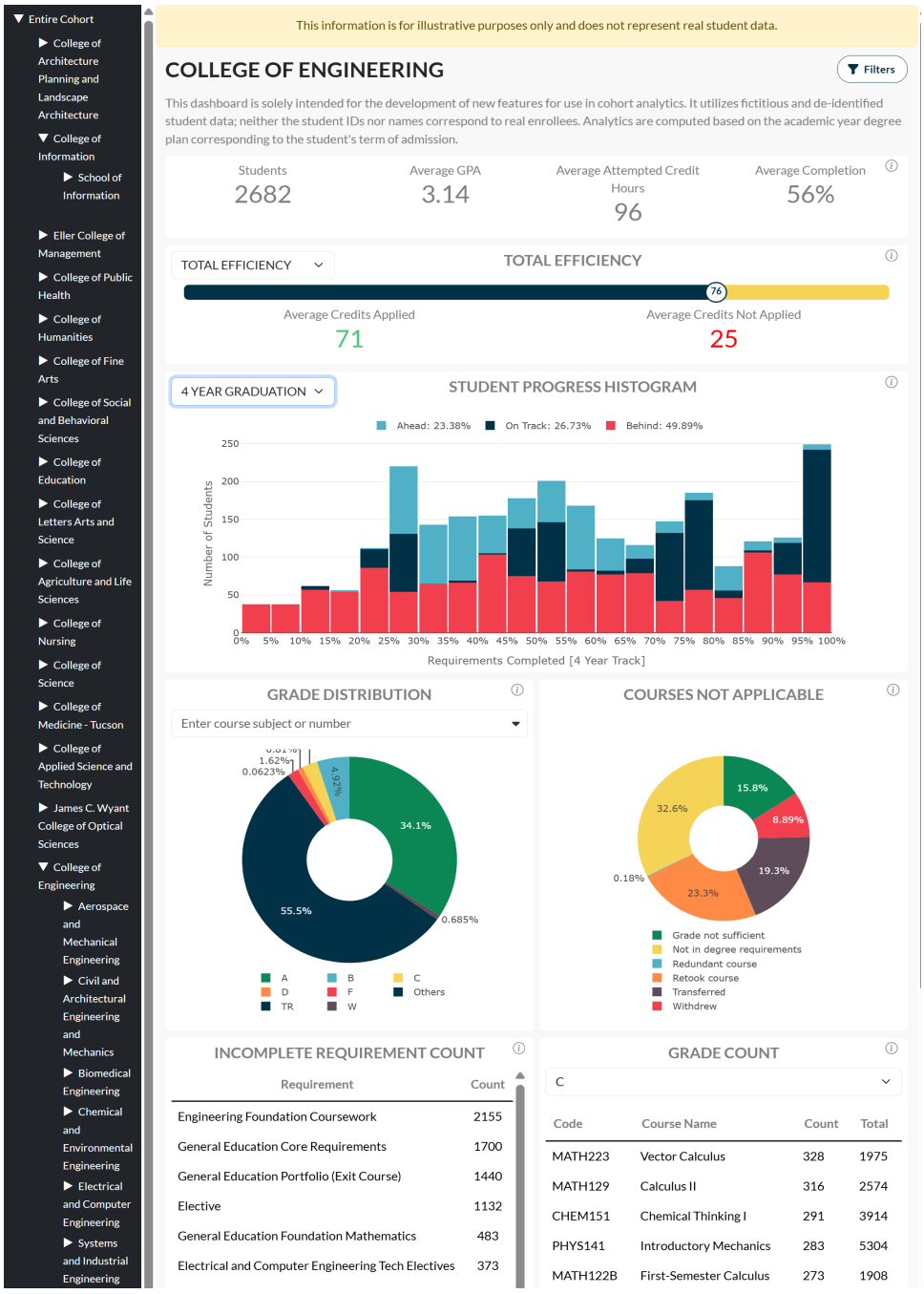



Figure 1: View of the newly developed cohort-based tracking platform

A newly developed cohort-based tracking platform, shown in Figure 1, closes this previous gap in learning analytics as it provides the previously described progress analytics toward these graduation milestones for both the cohort and individual students.[19] This type of analytics allows for the easy identification of discrepancies between total credits earned and credits applicable to degree programs. This granular approach eliminates the inefficiencies of manual record reviews, allowing advisors to focus on actionable strategies for degree completion.[16] By calculating progress

in relation to degree requirements, this platform streamlines the identification of at-risk students and directs attention to those needing immediate intervention. This cohort analytics dashboard provides faculty and administrators with actionable insights into credit accumulation and applicability, thus allowing for productive discussions and decisions on developing student success strategies.[16,19] These tools are instrumental in identifying struggling students and tailoring interventions to address specific needs, such as enrollment in critical courses or adjustments to academic pathways.

### Student Identification

By leveraging progress analytics, institutions can efficiently identify students at risk of missing graduation milestones, enabling timely and personalized interventions. These tools streamline the process of pinpointing at-risk students and facilitate the development of targeted, data-driven strategies that will improve student outcomes and in turn raise overall graduation rates. This study focuses on identifying and supporting near completers, defined as students who have made significant progress toward their degrees but require additional assistance to complete their requirements within a specific timeframe. Specifically, this research aims to identify students who are near completers who will fall short of graduation by 10 or fewer credits even after successfully completing their spring courses. These students, who are 90% or more complete with their degree requirements, will be the focus of targeted support strategies to address barriers and facilitate graduation this academic year. These students often encounter barriers to graduation beyond that of poor academic performance, such as insufficient applicable credits, financial challenges, or administrative hurdles, which hinder their ability to graduate on time.[20]

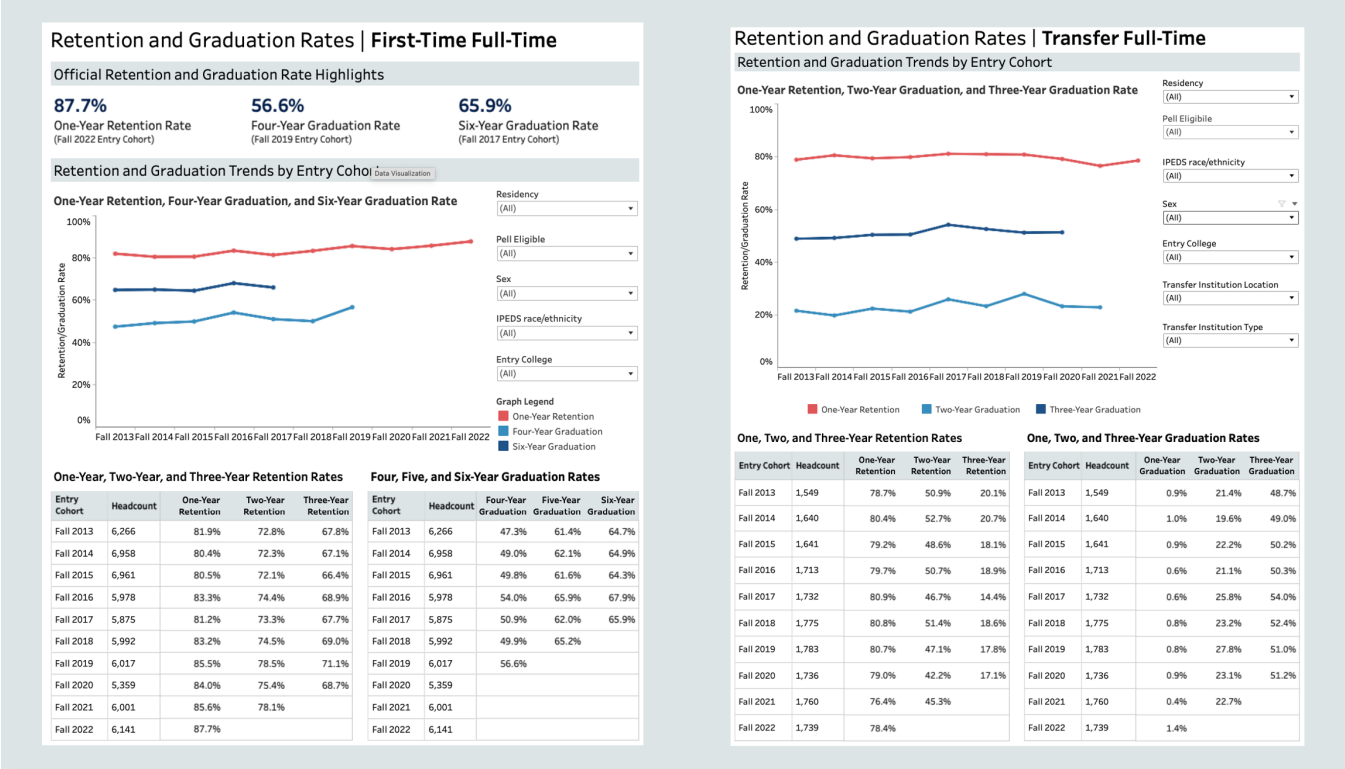
The urgency of addressing the challenges faced by near completers is particularly evident in fields like engineering, where according to national statistics only 33% of students graduate within four years, and approximately 40% fail to complete their degrees even after six years.[19,21] This trend underscores the importance of implementing proactive interventions to improve graduation outcomes and reduce attrition rates. Prior research has highlighted several effective strategies for supporting near completers, including personalized advising, financial assistance, and curricular adjustments.[7,22,23]

Personalized advising ensures that students are directed toward courses that align closely with their degree requirements, avoiding inefficiencies that can prolong their time to graduation.[16,24] Financial assistance is another critical component, as even modest support can alleviate tuition and fee-related barriers, allowing students to focus on completing their degrees without financial distractions.[25] Additionally, administrative flexibility, such as enabling credit substitutions or crafting tailored academic pathways, plays a pivotal role in facilitating timely degree completion.[26] Together, these strategies emphasize the importance of proactive institutional efforts to identify and support near completers, ensuring their successful transition from at-risk students to graduates.

### Initial Data

This ongoing study is being conducted at a public university, an R1 institution with an undergraduate enrollment of approximately 41,000 students that confers roughly 7,000 undergraduate degrees

each year. At the onset of the study, institutional metrics showed that the four-year graduation rate for first-time, full-time students had risen steadily from 47.3% for the 2013 entering cohort to 56.6% for the 2019 cohort. First-year retention rates consistently exceed 80%, with two-year retention above 70% and three-year retention just under 70%. Among transfer students, one-year retention is close to 80%, dropping to approximately 50% after two years and near 20% after three years. Transfer student graduation rates remain low in the early years—under 1% after one year and ranging from 21.4% for students who began in Fall 2013 to 22.7% for those who entered in Fall 2021 after two years. By the third year, the transfer graduation rate approaches 50%. In alignment with institutional priorities, this study aims to increase the four-year graduation rate for first-time, full-time students to 58.5% and improve the two-year graduation rate for transfer students to 25%.




| Entry Cohort | Headcount | One-Year Retention | Two-Year Retention | Three-Year Retention |
|---|---|---|---|---|
| Fall 2013 | 6,266 | 81.9% | 72.8% | 67.8% |
| Fall 2014 | 6,958 | 80.4% | 72.3% | 67.1% |
| Fall 2015 | 6,961 | 80.5% | 72.1% | 66.4% |
| Fall 2016 | 5,978 | 83.3% | 74.4% | 68.9% |
| Fall 2017 | 5,875 | 81.2% | 73.3% | 67.7% |
| Fall 2018 | 5,992 | 83.2% | 74.5% | 69.0% |
| Fall 2019 | 6,017 | 85.5% | 78.5% | 71.1% |
| Fall 2020 | 5,359 | 84.0% | 75.4% | 68.7% |
| Fall 2021 | 6,001 | 85.6% | 78.1% | |
| Fall 2022 | 6,141 | 87.7% | | |

| Entry Cohort | Headcount | Four-Year Graduation | Five-Year Graduation | Six-Year Graduation |
|---|---|---|---|---|
| Fall 2013 | 6,266 | 47.3% | 61.4% | 64.7% |
| Fall 2014 | 6,958 | 49.0% | 62.1% | 64.9% |
| Fall 2015 | 6,961 | 49.8% | 61.6% | 64.3% |
| Fall 2016 | 5,978 | 54.0% | 65.9% | 67.9% |
| Fall 2017 | 5,875 | 50.9% | 62.0% | 65.9% |
| Fall 2018 | 5,992 | 49.9% | 65.2% | |
| Fall 2019 | 6,017 | 56.6% | | |
| Fall 2020 | 5,359 | | | |
| Fall 2021 | 6,001 | | | |
| Fall 2022 | 6,141 | | | |

| Entry Cohort | Headcount | One-Year Retention | Two-Year Retention | Three-Year Retention |
|---|---|---|---|---|
| Fall 2013 | 1,549 | 78.7% | 50.9% | 20.1% |
| Fall 2014 | 1,640 | 80.4% | 52.7% | 20.7% |
| Fall 2015 | 1,641 | 79.2% | 48.6% | 18.1% |
| Fall 2016 | 1,713 | 79.7% | 50.7% | 18.9% |
| Fall 2017 | 1,732 | 80.9% | 46.7% | 14.4% |
| Fall 2018 | 1,775 | 80.8% | 51.4% | 18.6% |
| Fall 2019 | 1,783 | 80.7% | 47.1% | 17.8% |
| Fall 2020 | 1,736 | 79.0% | 42.2% | 17.1% |
| Fall 2021 | 1,760 | 76.4% | 45.3% | |
| Fall 2022 | 1,739 | 78.4% | | |

| Entry Cohort | Headcount | One-Year Graduation | Two-Year Graduation | Three-Year Graduation |
|---|---|---|---|---|
| Fall 2013 | 1,549 | 0.9% | 21.4% | 48.7% |
| Fall 2014 | 1,640 | 1.0% | 19.6% | 49.0% |
| Fall 2015 | 1,641 | 0.9% | 22.2% | 50.2% |
| Fall 2016 | 1,713 | 0.6% | 21.1% | 50.3% |
| Fall 2017 | 1,732 | 0.6% | 25.8% | 54.0% |
| Fall 2018 | 1,775 | 0.8% | 23.2% | 52.4% |
| Fall 2019 | 1,783 | 0.8% | 27.8% | 51.0% |
| Fall 2020 | 1,736 | 0.9% | 23.1% | 51.2% |
| Fall 2021 | 1,760 | 0.4% | 22.7% | |
| Fall 2022 | 1,739 | 1.4% | | |

Figure 2: Metrics for Retention and Graduation rates at institution prior to beginning of the study

Utilizing the cohort analytics platform to analyze student progress, ”opportunity lists” were generated prior to the start of the Fall 2024 academic year. These lists categorize students based on their progress toward degree completion based on degree requirements satisfaction rather than by total credit accumulation. These lists aim to identify students who may benefit from targeted interventions to improve graduation outcomes. Five specific opportunity lists were created based on student progress and enrollment status:

- List 1: First-time students who are 70% or more completed with their degree requirements and were enrolled in Spring 2024. This list contains 4,433 students.
- List 2: First-time students who are 70% or more completed but did not enroll in Spring 2024.

This list contains 192 students.

- List 3: Transfer-in students who are 70% or more complete and were enrolled in Spring 2024. This list contains 1,238 students.
- List 4: Transfer-in students who are 70% or more complete but did not enroll in Spring 2024. This list contains 97 students.
- List 5: First-time students who are between 60% and 70% complete are categorized as "Ahead". This list contains 884 students.

The cohort definitions included students with an IPEDS entry status of First-Time or Transfer-In whose admit term was Spring 2024 or earlier. These cohorts encompassed both full-time and part-time students who were actively enrolled or had been enrolled in any of the previous three semesters (Spring 2024, Fall 2023, or Spring 2023) but had not graduated by the data pull in September 2024. Students enrolled in certification programs, non-degree seeking, continuing education, or graduate programs were excluded. Additionally, three programs with a combined enrollment of nearly 1,000 students were absent from the fall data and have been excluded from this study.

To ensure actionable outcomes, the opportunity lists were disaggregated by college and shared with each college's leadership and advising teams. Meetings were held to review the lists, identify potential errors, and familiarize advising staff with the data. Departments and programs within each college contributed to refining the lists and developing targeted interventions to implement during the Spring semester to support students at risk of delayed graduation. The study will focus on two key groups from the opportunity lists: first-time students who were 70% or more complete at the start of the academic year (List 1) and transfer-in students who were 70% or more complete at the same point (List 3). These lists provide a baseline for understanding student progress before Fall outcomes were available.

List 1 consists of 4,433 first-time students who were 70% or more complete with their degree requirements at the start of the academic year and had successfully completed the Spring 2024 semester. Among these students, 4,244 (95.7%) were classified as full-time students, while 188 (4.2%) were part-time. Additionally, 1,376 students (31%) were identified as Pell Grant eligible. Of the cohort, 1,923 students (43.4%) were on track to graduate within the four-year milestone, with 1,907 of these students (99.2% of the on-track group) having started their degrees in Fall 2021. However, 1,122 students (25.3%) were classified as behind for four-year graduation. Within this group, 623 students (55.5%) improved to being on track or ahead for a five-year graduation, and this increased to 871 students (77.6%) were on track or ahead for a six-year graduation. On the other hand, 1,387 students (31.3%) in this list were considered ahead of schedule for a four-year graduation. Additionally, 768 students on this list had a progress completion of greater than 85% at the start of the current academic year. As we are only considering students listed as not having graduated, it is anticipated that many of these students will not be present in the mid-year data.

List 3 includes 1,238 transfer-in students who were 70% or more complete with their degree requirements at the start of the academic year and had successfully completed the Spring 2024 semester at the university that is the focus of this study. Of these students, 857 (69.2%) were

full-time, and 381 (30.8%) were part-time. The list also includes 743 students (60%) who were Pell Grant eligible. Only 254 students (20.5%) in this cohort were on track to complete their degree requirements within the four-year graduation milestone, while 881 students (71.2%) were classified as behind for four-year graduation. Within this group of students behind schedule, 402 (45.6%) students increased to being on track or ahead for a five-year graduation, and 633 (71.9%) students improved to being on track or ahead for a six-year graduation. In contrast, only 103 students (8.3%) in this list were ahead of schedule for a four-year graduation. The list contained 201 students with a progress completion of greater than 85%, which suggests that many of them will likely be absent from the mid-year data as they are expected to have graduated.

To further refine and support this effort, updated lists will be generated in January, incorporating Fall 2024 outcomes and current Spring 2025 enrollment. These new lists will focus on identifying "near completers," defined as students who, despite completing their Spring courses, will fall short of graduation by 10 or fewer credits. By incorporating recent enrollment data and academic progress, these updated lists will allow colleges to implement more precise and targeted interventions, ensuring that near completers receive the necessary support to overcome final obstacles to graduation.

**Mid-Year Progress**

A mid-year progress analysis was conducted on students from Lists 1 and 3, incorporating the outcomes of their Fall 2024 semester courses. This analysis provides updated insights into student progress and informs refinements to interventions for the Spring 2025 semester.

After the Fall semester, the number of students on List 1 decreased to 3,720, reflecting a reduction of 713 students. This reduction aligns closely with the anticipated amount based on initial projections. The remaining students experienced an average increase of just over 11 percentage points in their progress completion, raising the average degree completion percentage to 89.5%. Within this updated list, 1,621 students, or 43%, are now considered on track to graduate within the four-year milestone, while 1,161 students, or 31.2%, are ahead of schedule for a four-year graduation. However, 938 students, or 25%, remain classified as behind for a four-year graduation. Among the students classified as behind, 538 improved to being on track or ahead for a five-year graduation, and an additional 205 advanced to being on track or ahead for a six-year graduation. Despite these improvements, 195 students remain behind for a six-year graduation.

The number of students on List 3 decreased to 843 after the Fall semester, representing a reduction of 395 students. This reduction is significantly greater than anticipated. The remaining students showed an average increase of 8 percentage points in their progress completion, resulting in an average completion percentage of approximately 86%. Within this updated list, 56 students, or 6.6%, are ahead of schedule for a four-year graduation, and 140 students, or 16.6%, are on track for a four-year graduation. However, 647 students, or 76.7%, remain classified as behind for a four-year graduation. Among those behind, 296 students improved to being on track or ahead for a five-year graduation, and an additional 155 advanced to being on track or ahead for a six-year graduation. Nevertheless, 196 students are still considered behind for graduation even after six years of enrollment.

This mid-year analysis highlights both the progress made by students in these lists and the remain-

ing challenges in ensuring timely graduation for all near-completers. The findings underscore the importance of continued interventions and tailored support to help students overcome barriers to degree completion.

**Predicted Progress**

Predictive analytics plays a pivotal role in identifying the students most in need of targeted interventions by forecasting their degree completion outcomes based on current enrollment data. These analytics integrate progress analytics and include the courses in which students are enrolled for the upcoming Spring 2025 semester. The analysis assumes that students will achieve satisfactory grades in these courses, allowing them to be applied toward degree requirements. By leveraging this data, predictive progress analytics provide insights into which students are on track to graduate and which students will require additional support to meet their degree completion goals.

Using current Spring 2025 enrollment data, predictive progress analytics were conducted for the first-time students in List 1 and the transfer students in List 3. Of the 3,720 students on List 1, the analysis predicts that 1,502 students will complete their degree requirements and graduate at the end of the Spring semester without any additional interventions. Conversely, 903 students will have less than 91.66% progress completion or be more than 10 credits shy of degree completion by the semester's end. The remaining 1,315 students from List 1 are identified as near completers and will be the primary focus of the proposed interventions. Without additional support, these students are unlikely to graduate within the current academic year.

| List | 91.66% or Less | 91.67 – 99% | 100% | Total |
|---|---|---|---|---|
| List 1: First-Time Full Time | 903 | 1315 | 1502 | 3720 |
| List 3: Transfer Students | 442 | 235 | 166 | 843 |

Figure 3: Expected Progress for students using predictive analytics

For the 843 transfer students on List 3, predictive analytics indicate that 166 students will complete their degrees at the conclusion of the Spring semester without requiring further intervention. However, 442 students will have less than 91.66% progress completion or will be more than 10 credits shy of graduation. The remaining 235 students from List 3 are classified as near completers and will be included in the focus of the proposed interventions and additional support efforts. Together, the 1,315 students from List 1 and the 235 students from List 3 result in a total of 1,550 students who will be the focus of targeted interventions to support degree completion.

This predictive analysis highlights the importance of utilizing advanced analytics to proactively identify students who require tailored assistance to stay on track for graduation. By pinpointing these students early, institutions can implement strategic interventions to maximize their like-

lihood of success, contributing to improved graduation rates and enhanced institutional performance.

**Proposed Interventions**

In order to address the challenges faced by near-completers in an effort to improve graduation rates, this study outlines a series of tailored interventions designed to meet the specific needs of students across different colleges within the university. Recognizing the diversity of academic programs and the unique challenges within each discipline, these interventions aim to provide individualized and actionable solutions to support students. Each college will implement various interventions discussed and designed during one-on-one meetings held in the fall semester when the opportunity lists were presented to the colleges. These opportunity lists, generated using progress analytics, enable the precise identification of near-completers and provide detailed insights into their degree requirement satisfaction. All interventions are currently being implemented, and preliminary results are anticipated to demonstrate their impact on graduation rates by the end of the academic year.

Each college within the university has developed targeted strategies based on the identified needs of its students. For programs where a significant number of near-completers require the same course to graduate, colleges have the flexibility to offer or add this course to the Spring semester schedule. Addressing gaps in course availability ensures that students can fulfill their remaining requirements without delay. Advisors are also actively reviewing the Spring enrollment plans of near-completers to ensure that students are enrolled in courses that satisfy degree requirements. This review, facilitated by insights from progress analytics and conducted prior to or at the beginning of the semester, allows for schedule adjustments to ensure students take the necessary courses for degree completion. This proactive approach addresses a common issue where students' degree requirements are not thoroughly reviewed until they apply for graduation, which often occurs well into the semester when schedule changes are no longer feasible. Students are frequently unaware of unmet degree requirements and focus on credit hour accumulation. By identifying and addressing unsatisfied requirements early through the use of analytics, this intervention helps prevent delays in degree completion and ensures students are on track to graduate within the current academic year. For transfer students, special attention is being given to credits not currently applicable toward degree requirements. By re-evaluating these courses, colleges aim to identify opportunities to substitute transfer credits for general education or major elective requirements, thereby streamlining the degree completion process for students with significant prior coursework.

In an effort to support students who are projected to be only one or two courses shy of graduation after the Spring semester, a plan to provide financial assistance is being developed that will help cover tuition and fees for summer enrollment. This targeted financial aid is designed to alleviate the financial burden that might otherwise prevent these students from completing their degrees over the summer semester. By enabling students to finish their final courses over the summer, this intervention ensures they can graduate before the start of the next academic year, minimizing delays in their entry into the workforce.

These interventions collectively aim to address key barriers near-completers face by reducing the number of students delayed by unavailable courses or unmet requirements, providing flexible

pathways for students to meet their degree requirements, and supporting financially constrained students in completing their degrees without interruption. By implementing these strategies, the university anticipates a notable increase in graduation rates for the current academic year. Furthermore, the outcomes of these interventions will provide valuable insights into the efficacy of targeted, college-specific support, offering a scalable model for improving student success across institutions.

## Conclusion

This study highlights the critical role of targeted, data-driven interventions in improving graduation rates by focusing on near-completers. By leveraging progress analytics and predictive modeling, the research identifies students at a pivotal stage in their academic journey, enabling institutions to provide timely and tailored support. The results of mid-year evaluations and predictive analytics underscore the effectiveness of such tools in guiding intervention strategies, with particular attention to students who are close to achieving degree completion but face barriers that might otherwise delay their progress.

In order to achieve the goal of improving graduation rates by 5% at this institution, an increase in graduates would need to range between 350 and 400 students. This study has identified more than 1,500 students who are unlikely to graduate by the end of the Spring semester without additional support or interventions. These findings emphasize the importance of proactive measures to address the unique challenges faced by these near-completers, providing them with the resources and guidance necessary to reach their academic goals.

The interventions implemented, ranging from tailored advising to financial support, represent a proactive approach to addressing diverse challenges faced by near-completers. By aligning institutional resources with student needs, the university aims to enhance not only individual outcomes but also broader institutional performance. As the study progresses, the insights gained from these strategies hold the potential to inform scalable models that other institutions can adopt, contributing to a more inclusive and effective higher education landscape. This ongoing effort emphasizes the importance of collaboration, adaptability, and innovation in fostering student success and ensuring timely graduation.

## References


[1] Yearly progress and completion. Technical report, National Student Clearinghouse Research Center, 2024.

[2] N. Rodriguez-Planas. Hitting where it hurts most: Covid-19 and low-income urban college students. *Economics of Education Review*, 87, 2022.

[3] G. Bulman and R.Fairlie. The impact of COVID-19 on community college enrollment and student success: Evidence from California administrative data. ." *Education Finance and Policy*, 17(4):745–764, 2022.

[4] L. Gonzales and A. Núñez. *Measuring up in higher education: How university rankings and league tables are re-shaping knowledge production in the global era*. Palgrave Macmillan, 2021.

[5] M. Cheng, O. Adekola, J. Albia, and S. Cai. Employability in higher education: a review of key stakeholders' perspectives. *Higher Education Evaluation and Development*, 16(1):16–31, 2022.

[6] B. Cook and N.Pullaro. *College graduation rates: Behind the numbers*. American Council on Education, 2010.

[7] A. Slim, G. Heileman, M. Akbarsharifi, K. Manasil, and A. Slim. Causal inference networks: Unraveling the complex relationships between curriculum complexity, student characteristics, and performance in higher education. In *2024 ASEE Annual Conference  Exposition*, Portland, Oregon, June 2024. ASEE Conferences.

[8] S. Wilbers and J. Brankovic. The emergence of university rankings: a historical sociological account. *Higher Education*, 86(4):733–750, 2023.

[9] S. Gallagger. *The future of university credentials: New developments at the intersection of higher education and hiring*. Harvard Education Press, 2022.

[10] A. Finley. How college contributes" to" workforce success: Employer views on what matters most. Technical report, Association of American Colleges and Universities, 2021.

[11] J. Norvilitis and B.Linn. The role of student debt and debt anxiety in college student financial well-being. *Journal of Student Financial Aid*, 50(3), 2021.

[12] J. Lockwood and D. Webber. Non-completion, student debt, and financial well-being: Evidence from the survey of household economics and decisionmaking. Technical report, FEDS Notes. Washington: Board of Governors of the Federal Reserve System, 2023.

[13] P. Baepler and C. J. Murdoch. Academic analytics and data mining in higher education. *International Journal for the Scholarship of Teaching and Learning*, 4(2):17, 2010.

[14] A. G. Picciano. The evolution of big data and learning analytics in american higher education. *Journal of Asynchronous Learning Networks*, 16(3):9–20, 2012.

[15] M. D. Pistilli and K. E. Arnold. Purdue signals: Mining real-time academic data to enhance student success. *About Campus*, 15(3):22–24, 2010.

[16] H. Al Yusuf, G. Heileman, R. Islam, Y. Zhang, T. Agrawal, H. Free, and K. Manasil. Progress analytics in support of engineering advising and program reform.". In *2023 ASEE Annual Conference & Exposition*, Baltimore, Maryland, June 2023. ASEE Conferences.

[17] A. Pathare, B. Savliwala, N. Shekokar, and A. Gawade. Similarity-based recommendation system using k-medoids clustering. *Advances in Distributed Computing and Machine Learning: Proceedings of ICADCML*, pages 545–556.

[18] P. Talbert. Strategies to increase enrollment, retention, and graduation rates. *Journal of Developmental Education*, 36(1):22, 2012.

[19] K. Manasil, G. Heileman, B. Sharma, A. Slim, A. Pathare, H. Al Yusuf, R. Sharifi, R. Hemaraja, and M. Akbarsharifi. Using cohort-based analytics to better understand student progress. In *2024 ASEE Annual Conference Exposition*, Portland, Oregon, June 2024. ASEE Conferences.

[20] A. Slim. *Curricular Analytics in Higher Education. Ph.D. Thesis*. PhD thesis, Albuquerque, NM, 2016.

[21] B. Yoder. ASEE Retention and Time-to-Graduation Benchmarks for Undergraduate Engineering Schools, Departments and Programs. . Technical report, Washington, DC, 2016.

[22] G.D. Kuh, J.L. Kinzie, J.A. Buckley, B.K. Bridges, and J.C. Hayek. What matters to student success: A review of the literature. *Washington, DC: National Postsecondary Education Cooperative*, 8, 2006.

[23] T.S. Jalolov. The importance of information communication in higher education. *WORLD OF SCIENCE*, 7(8):14–19, 2024.

[24] Aryan Pathare, Ramchandra Mangrulkar, Kartik Suvarna, Aryan Parekh, Govind Thakur, and Aruna Gawade. Comparison of tabular synthetic data generation techniques using propensity and cluster log metric. *International Journal of Information Management Data Insights*, 3(2):100177, 2023.

[25] J. Jabbari, M. Despard, O. Kondratjeva, B. Gupta, and M. Grinstein-Weiss. Nothing to show for it: Financial distress and re-enrollment aspirations for those with non-degreed debt. *Research in Higher Education*, 64(1):1–32, 2023.

[26] Y.Zhang, G. Heileman, A. Slim, and H. Al Yusuf. Optimizing transfer pathways in higher education. In *2024 ASEE Annual Conference  Exposition*, Portland, Oregon, June 2024. ASEE Conferences.