Supercharged: The future of data-informed online student support

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Aligned to: learning analytics and data mining

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Introduction

National Louis University (NLU) is a private, non-profit, Minority Serving Institution (MSI) located in Chicago, with additional campuses in downtown Chicago, Chicago's suburbs, Tampa, Florida, and an online platform. Currently, NLU has an enrollment of over 10,000 students, with 53% at the graduate level and 47% at the undergraduate level. In 2017, NLU partnered with an Online Program Manager (OPM) company to expand its online student population. This initiative led to valuable insights and experiences in supporting teaching, learning, and online student services, resulting in the establishment of an exemplary learning analytics framework. Implementing this system and its associated protocols contributed to a significant reduction in attrition rates triggered by the growth facilitated through the OPM collaboration. Consequently, NLU is now well-positioned to leverage the future integration of artificial intelligence (AI) to automate the identification of online student support triggers, as well as the interventions they call for–and much more.

This chapter serves as a case study, providing a foundation for the future of learning analytics and data mining through the application of AI. The NLU team responsible for designing the initial learning analytics system and its protocols will describe the origins and current state of their extensive data repository, the data sources feeding into it, the resulting dashboards generated from the data, as well as the protocols followed by university stakeholders who review these dashboards daily. Additionally, the chapter will utilize future mapping and scenario writing to identify critical gaps and areas of opportunity that could be enhanced through the integration of AI to optimize the system further, relieve university stakeholders of mundane tasks, and ultimately meet the evolving needs of the expanding online student and faculty population at NLU, as well as other institutions seeking to implement similar systems for improvement.

Since integrating AI into systems supporting online students cannot be underestimated as a potential advantage in higher education, and given the ever-growing financial constraints faced by post-secondary institutions, it is crucial to leverage technology to evolve and better serve students. With AI in learning analytics representing just the beginning of this transformative journey, this chapter will leave readers with a series of scenarios and futures that could exist with the incorporation of AI into an existing learning analytics environment.

Literature Review

Learning Analytics (LA) is an emerging and continuously evolving field. LA's most

widely used definition is "the measurement, collection, analysis, and reporting of data about learners and their contexts, for purposes of understanding and optimizing learning and the environments in which it occurs" (Siemens, 2011, p. 34). While the analyses of information related to teaching and learning data are not novel, LA has taken center stage as the growth of online learning and the use of learning management systems (LMS) – systems where online learning takes place – have permeated university and college life. The resulting outcome of these two shifts in higher education have now amassed large datasets that can be used to understand better teaching and learning for the betterment of education and student success.

As the wide-scale use of online tools in university-level courses has grown, a rich body of data on learning in those environments has also increased, which faculty, administrators, and researchers can now mine. Even early on, researchers such as Firat (2016) found that using data from an LMS enabled an institution to identify "problematic aspects of the course…[to] be identified and student learning can be evaluated" (p. 76). Further, learning analytics aims to "use learner-produced data to gain actionable knowledge about learner's behavior in order to optimize contexts and opportunities for online learning (e.g., correlating the online activity with academic performance)." (Caspari-Sadeghi, 2023, p. XX). Increasingly, LA researchers have begun to believe that data analyses hold promise for institutions of higher learning to make evidence-based decisions leading to improved student success (Knight, Buckingham Shum, & Littleton, 2014; Gašević, Dawson, & Siemens, 2015; Nguyen, Rienties, Tempelaar, & Giesbers, 2016; Mcfayden & Dawson, 2012; Siemens & Long, 2011).

At the same time, around the world, higher education and society are generally rapt with the increasing proliferation and promise of artificial intelligence (AI). AI can best be defined by John McCarthy, the founding father of artificial intelligence, as "the science and engineering of making intelligent machines, especially intelligent computer programs" (McCarthy, n.d., line 3). AI can support and augment teaching and learning environments by employing intelligent and inexhaustible tutoring, intelligent agents embedded in standard software used in the higher education sector, such as the student information system (SIS) and the learning management system (LMS), and intelligent collaborative learning systems where AI could then bring disparate systems into a one-stop learning space (Salas-Pilco, et al., 2022). As the sector considers how, when, and where to integrate AI into everyday campus life, EDUCAUSE (Zeide, 2019, August 26) aptly pointed out as early as 2019 that some of the critical applications for institutions of higher education would be:

1. Institutional: front-end student lifecycle support related to attracting students, admitting, and enrolling them; as well as registration and academic programming applications,
2. Student Support: support of students while they are on their academic journey, such as optimizing financial aid, guiding students through decisions related to their degree, and early-warning systems, and
3. Instructional: improving teaching practice, personalizing learning, and other supports related to teaching and learning.

One can easily see significant opportunities to integrate AI into student supports as one considers how much data an institution intakes and amasses during a student's life cycle, from pre-enrollment data collected at the time of application, through financial aid application information, academic behaviors, and decisions related to career outcomes. Unfortunately, most

of these data exist in disparate systems that may or may not be mined and combined to highlight a fuller picture of a student and what individual needs they may have to persist, graduate, and obtain a rewarding career. Considering the veracity and diversity of systems collecting and generating student data, it is increasingly difficult and nearly impossible for humans and even units dedicated to analyses in a university setting to make sense of or use these data for decision-making (Caspari-Sadeghi, 2023); continuing to add to the adage of "data rich, but insights poor" (McKinsey, December 2022, p.3). Aligning to a recent McKinsey report (2022, December 2), the use of AI in big data analyses will significantly accelerate the ability to consume, review, and identify issues like no human could ever do in the same amount of time.

Importantly, AI can be integrated into an institution's data repositories to help identify individualized student supports and determine personalized learning paths that teachers can adopt (Dickler, 2021, November 8). One can easily imagine just-in-time and individualized academic journeys made possible by using artificial intelligence to analyze data and determine need, while student support employees and faculty then provide those interventions to ensure a student has the most optimal chance at success.

Methods

With the wealth of data emanating from existing systems and the power of AI to impact decision-making within an institution, the NLU team has begun considering how the university might implement and utilize artificial intelligence applications in the regular course of business, mainly focused on enhancing its data and analytics systems. To evaluate how the institution might bring AI into existing data structures and support systems, a number of potential futurist methodologies were considered to facilitate this work. The NLU team chose future mapping and scenario development methodologies to guide the process, given their alignment to this type of current state assessment and futuristic planning process.

To increase the team's comfort with, understanding of, and ability to integrate AI, the team chose to use AI as an active participant in the method. The team's process specifically used Chat GPT 4 for both the future mapping and scenario development process, as a means of immersive use of this lauded large language model, but also to leverage the capability and speed of AI to facilitate the team's progress.

Future Mapping

Future mapping methodology is a comprehensive framework that synthesizes qualitative and quantitative information to create a comprehensive and holistic view of the future. Future mapping's approach anticipates, analyzes, and shapes the trajectory of a future outcome. The methodology's chief power is in its expansive rather than restrictive approach that enables the exploration of multiple scenarios, the anticipations of challenges, and the opportunity to seize upon opportunities that may not have been generated via traditional brainstorming methods. According to Phillips (1996, p. 10), "Future mapping is a powerful process for creating a compelling vision, deciding how to achieve it, and generating a motivation to act." Key elements of the methodology include:

1. Environmental Scanning: beginning with an in-depth analysis of the current landscape (of an organization, product, or service), including social, technological, economic,

environmental, and political factors. This process involves collecting data, monitoring trends, and identifying emerging patterns;

2. Stakeholder Engagement: emphasizing the involvement of diverse stakeholders, including experts, policymakers, and representatives from various industries and communities. Their perspectives and insights enrich the process by offering different viewpoints and challenging assumptions held by the team conducting the mapping; and
3. Foresight Analysis: utilizing a range of tools and techniques, such as trend analysis, horizon scanning (a part of future studies that utilizes the systematic review of potential strengths, weaknesses, and opportunities that may arise out of a particular event), and expert interviews, future mapping methodology uncovers weak signals, (or early indications) and emerging trends that may shape the future. By identifying potential disruptions and discontinuities through foresight analysis, this methodology enables a team to make decisions proactively and to plan more strategically.

Scenario Development

Since a hallmark of future mapping is to generate several potential futures, the NLU team recognized that a second set of actions would need to carefully vet each one to make the best decision(s) for the future of learning analytics at NLU. Because the possible results were varied and also unique, meaning it is possible these different futures could produce wildly different results, the team chose to implement scenario development method to describe the potential futures in more detail and to provide a foundation for exploring the impact of each on student success; aligned to the perspectives of Rhisiart, Miller, and Brooks (2015) in indicating that scenario planning helps create new strategic choices for decision-making as part of a disciplined future planning process.

Scenario development in this context involves an in-depth examination of each potential future with the aim of generating rich and detailed insights into each's feasibility, viability, and potential impact/results. A significant advantage of the technique is its flexibility and adaptability because it can be utilized in various disciplines, including social sciences, data analytics, business, education, and healthcare, among others. The technique can also include multiple rounds of data collection tailored to suit different objectives. In this way, scenario development is akin to rapid prototyping or simulation planning, where a team can investigate potential futures with a proven framework meant to increase the fidelity to decision-making to those futures with the highest likelihood of success.

Key questions for the NLU team were a) what do these possible futures mean for the university and its students, faculty, and staff, b) and what are the potential impacts on both the use of data and on the business processes being improved by the incorporation of AI? Underpinning this process was the need to develop multiple scenarios that are constructed based on different combinations of key drivers and uncertainties and then running through each scenario to completion to assess its chances of success. By carefully selecting and examining each scenario, The NLU team was able to generate critical, detailed insights that contributed to developing a deeper understanding, drawing meaningful conclusions, and in making practical decisions for the incorporation of AI into the institution's learning analytics environment.

In the end, scenario development has many advantages, including its holistic view, contextualized and flexible approach, and overall adaptability, making it a valuable tool in

planning for the future. The result of incorporating Chat GPT 4 into this process was even more helpful since it could run through the scenarios much more quickly than the team could, and it could also pair the scenarios with abundant additional data that would take considerable time for the team to assemble. This resulted in a rich analysis of ways AI could be incorporated into NLU's learning analytics framework and how this might further contribute to student success in the future–at a speed that the team would not have been able to achieve otherwise. ChatGPT also expanded the team's thinking and produced results that would not have been easy to acquire quickly (i.e., expert perspectives) and it provided a wealth of additional information to consider as well (e.g., trends the team was not aware of, weak signals the team's biases may have prevented them from clearly seeing, and a more in-depth environmental scan).

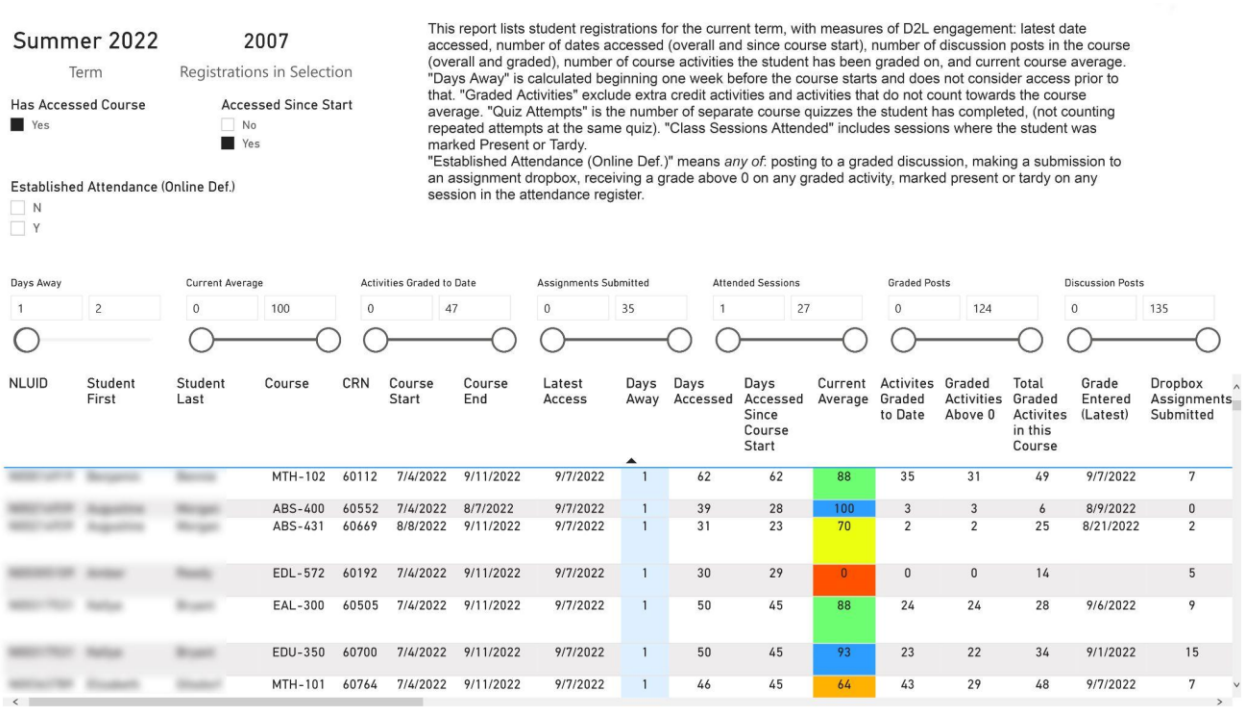
Findings

NLU has a rich history in data-informed decision-making, and the learning analytics framework is no exception. Specifically, the institution invested time and resources early on in the growth of online education to create an early warning system for online students. This system pulls data from several institutional repositories to help identify online students who may need additional support via faculty, student advisors and coaches, and learning support specialists. In the preceding sections, the NLU team utilized ChatGPT to expedite scenario building and future mapping to explore the transformative potential of integrating AI into the existing infrastructure. Key challenges and opportunities are presented, along with the ethical considerations each raises. Scenarios and potential futures were generated with an underpinning of the existing learning analytics system. With the additional inputs leveraged through the methodologies detailed in the previous sections, new possibilities were presented that would build upon this system focused on early warning to include: a) personalized learning paths, b) virtual teaching assistants, c) community building and engagement, d) enhanced, inexhaustible tutoring, e) career support, and d) intelligent course development.

AI-driven Early Warning Systems

Current state. In order to begin the journey of investigating how the incorporation of AI could enhance the existing learning analytics infrastructure at NLU, it is important to review the current state. Currently, the university gathers a wealth of data from various systems such as the Customer Relationship Management system - CRM (Salesforce), the Learning Management System - LMS (Brightspace), the Student Information System - SIS (Banner), and the Student Success System (EAB). These data are fed into a vast data lake that feeds visualizations and dashboards in Microsoft PowerBI. Built upon foundational knowledge related to at-risk student behavior in the online environment, the dashboards help to identify students early on that might exhibit such things as a) not logging into their course(s) for 72 hours, b) missing an assignment, c) failing an assignment, and d) engaging at low levels. Figure 1 shows how the dashboard is presented to faculty and staff to take action upon.

Figure 1.



So, while information is available to take action upon, these dashboards are not fully utilized to predict student outcomes, and they do not triangulate other data that might contribute to student risk or success (e.g., pre-enrollment factors, financial aid information, etc.). Some attempts have been made previously to create predictive models. However, these models have not proven particularly effective, partially due to the lack of internal expertise to develop such models and because past models were running out of one particular system, unable to access other critical data stored in other systems. As a result, students at risk of falling behind or dropping out may only be identified once it is too late for effective intervention.

Future state: In the future, a potential future is an AI-driven early warning system that leverages the data from various institutional repositories to identify at-risk students at a much earlier stage. AI would analyze various data points, such as student engagement, performance metrics, and behavioral patterns, to identify students who may be at risk of falling behind or dropping out in a way that humans and static dashboards would not be able to. The system could then proactively reach out to those students and alert educators and support staff, enabling those employees to intervene quickly to provide necessary assistance.

This system could also predict potential issues before they become significant problems, allowing for preventative measures to be taken. For example, if a student is consistently submitting assignments late or not participating in online discussions, the system could flag this behavior as a potential sign of disengagement or struggle, prompting early intervention that would not have otherwise risen to the surface in the existing system.

To implement this early warning system, the institution would need to integrate AI with the university's data lake (the repository where data from the various systems are currently fed). AI would need to be trained on historical information to understand and interpret the data from our various systems, identifying patterns and trends that indicate a student may be at risk. This could involve machine learning algorithms, which can learn and improve over time, becoming more accurate in their predictions. This system, however, would not come without potential

challenges. One of the primary concerns would be ensuring the accuracy and reliability of the predictions. To address this, the institution could implement a system of checks and balances where the AI's predictions are regularly reviewed and validated by human staff. Another challenge would be ensuring the privacy and security of student data. It would be critical to implement robust data protection measures and ensure that the AI is only accessing and using data in a way that complies with all relevant privacy laws and regulations.

While the current state of predictive modeling at the university is lacking, the future state, facilitated by an AI-driven early warning system, offers significant potential for improving student outcomes. By leveraging the existing infrastructure and addressing potential challenges, NLU could create a system that identifies at-risk students early and enables effective intervention. Moreover, this AI-infused learning analytics system would open up many other possibilities for additional opportunities to better support teaching and learning at the institution, such as a) personalized learning paths, b) virtual teaching assistants, c) community building and engagement, d) enhanced, inexhaustible tutoring, e) career support, and d) intelligence course development.

Personalized learning paths

With an intelligent early warning system, it can be increasingly easier to leverage AI to develop personalized learning paths for each student based on their strengths, gaps, and learning preferences. This type of focused learning could lead to a more effective learning experience, higher retention rates, and improved academic performance. Moreover, in today's educational landscape, both online and in-person, teaching techniques are largely standardized. Faculty follow a *one-size-fits-all* approach, primarily teaching "to the average student," which may not cater to individual students' unique strengths, backgrounds, and needs.

With an infrastructure of an intelligent early warning system and the further use of AI, each student could embark on a personalized learning journey tailored to their academic strengths and weaknesses and their unique backgrounds, career aspirations, and personal interests. This scenario is particularly transformative for online learning, where technology can be leveraged to deliver a highly personalized and flexible learning experience. AI could analyze data from the university's various systems to understand each student's unique profile. Then it could use this information to create a customized learning map for faculty to use with each student. For example, within a course, if a student excels in hands-on, practical assignments but struggles with written reports, the AI could adjust the course content to provide more project-based learning opportunities. Outside of individual courses, if a student is aiming for a career in a specific field, the AI could recommend a sequence of courses and extracurricular activities that align with the skills and knowledge required in that field.

This scenario, while worthy, would require a significant shift in the university's current systems and processes. New systems would need to be developed to deliver personalized learning experiences, and existing systems would need to be adapted to support this new approach. Additionally, the AI would need to be integrated with the university's Data Lake and trained to interpret data from various sources. Implementing personalized learning paths is a complex task requiring a fundamental shift in how education is delivered, moving from a

standardized approach to a highly individualized one. This would involve significant changes to the university's systems and processes and potentially even the broader educational system. Another challenge is ensuring that personalized learning paths do not overemphasize certain skills or subjects at the expense of a well-rounded education. The AI needs to be programmed to maintain a balance in its recommendations, ensuring that students receive a comprehensive education while still catering to their individual strengths and interests. Despite its challenges, the potential of personalized learning paths is significant. By leveraging AI to tailor education to each student's unique needs, higher education could revolutionize the learning experience and improve academic outcomes.

Virtual teaching assistants

Related to personalized learning paths, AI-powered virtual teaching assistants could help answer student questions, provide feedback, and offer additional resources to enhance learning. This can support students outside regular classroom hours and reduce the workload on faculty and learning support specialists. At present, student queries and doubts outside of classroom hours are typically addressed through email or during office hours. While functional, this approach has limitations where responses can be delayed, particularly during peak times, and students may have to wait for clarification on critical concepts. Delays in response can hinder a student's progress and potentially affect their performance.

Furthermore, faculty members often find themselves answering the same questions repeatedly, which can be time-consuming and detract from their primary teaching responsibilities. Leveraging the AI-driven early warning system and the work of AI-based personal learning paths, a student could have access to a Virtual Teaching Assistant (VTA). This AI-powered tool would be available 24/7, providing immediate responses to student queries. The VTA could be programmed with course-specific information, allowing it to answer a wide range of common questions. For more complex queries, the VTA could direct students to relevant resources or escalate the issue to a human educator. In addition to providing academic support, the VTA could also handle many administrative tasks currently performed by faculty and staff, such as automatically grading assignments based on pre-set criteria, tracking student attendance, and managing course schedules. This type of automation would free up time for faculty and staff to focus on more value-added activities.

To implement a VTA, an institution could leverage the wealth of data available from a Learning Management System (LMS) and Student Information System (SIS); systems that contain valuable information about student behavior, performance, and engagement, which could be used to train the AI. For example, the AI could learn from past student queries to anticipate common questions or areas of difficulty. It could also use data on student performance to provide targeted support for struggling students. Even so, implementing a VTA would not be without its challenges. For instance, ensuring the accuracy of the AI's responses would be critical though this could be addressed by having a human review and approve the AI's responses initially, with the AI learning and improving over time. Privacy and data security would also be a priority, requiring robust measures to protect student data.

Incorporating sentiment analysis and feedback could also be used to monitor student feedback and discussion forums, identifying common issues or concerns and allowing faculty and staff to address them in a timely manner. This system could conduct sentiment analysis on

student feedback, providing a more nuanced and comprehensive understanding of student experiences. This AI-powered tool could analyze text from various sources, such as course evaluations, discussion forums, and email communications, to identify the sentiments expressed by students to detect positive, negative, and neutral sentiments, as well as more specific emotions such as frustration, satisfaction, confusion, or excitement. These analyses could provide insights into how students feel about their courses, the teaching methods, course materials, and overall learning experience. This said, implementing sentiment analysis would come with its own challenges; chief among them would be ensuring the accuracy of the AI's sentiment analysis, requiring human reviewers to validate the AI's analysis, at least initially. Over time, as the AI learns and improves, it could become more accurate in its sentiment detection and help faculty better understand how to serve their students. Another challenge would be ensuring the privacy and security of student feedback. Institutions would need to implement robust data protection measures and ensure that the AI is only accessing and using feedback data in a way that complies with all relevant privacy laws and regulations. Despite these challenges, the potential benefits of sentiment analysis and VTAs are significant. By providing a more nuanced and comprehensive understanding of student sentiment and having timely responses to them, AI could help an institution enhance its courses, teaching methods, and overall learning experience, leading to improved student satisfaction and academic outcomes.

Community building and engagement

As the enhanced early warning system is catching students who are "at-risk" much earlier and students are receiving the type of teaching and learning environments they need to be successful, leveraging AI-driven social network analysis could also be used to identify and foster connections among students, faculty, and alumni, helping to build a strong community and improve overall student satisfaction.

At present, community building and engagement at many institutions can be somewhat fragmented and conceptualized from a campus-based mindset nearly exclusively. The challenge remains in creating a sense of community transcending physical boundaries and time constraints, particularly in an online learning environment. To this end, AI could be pivotal in fostering a vibrant, connected, and engaged university community. Specifically, an AI system could analyze data from various sources, such as social media, discussion forums, and event attendance records, to understand the interests, needs, and behaviors of the community members–even predicting them, similar to how social media platforms and/or streaming services do now (i.e., "you might like"). The AI could then use this information to facilitate community building and engagement in several ways, such as:

1) Personalized event recommendations: recommending events to students, faculty, and staff based on their interests, academic focus, and previous event attendance. This could increase event participation and help individuals find the most relevant and engaging events.
2) Virtual community spaces: facilitating the creation of virtual community spaces based on shared interests or academic focus. These spaces could provide a platform for discussion, collaboration, and connection, fostering a sense of community among members.

3) Community engagement analytics: analyzing engagement data to identify trends, such as popular discussion topics or highly attended events. This could provide insights to help the university enhance its community-building efforts.
4) Proactive engagement: proactively reaching out to individuals who may be less engaged, suggesting events or community spaces they might be interested in. This could help ensure that all community members feel included and engaged.

To implement this vision, institutions need to integrate AI with its existing systems and data sources, then train it to interpret and analyze data related to community engagement and make recommendations based on this data. It would be critical to ensure the privacy and security of community members' data by creating robust data protection measures and ensuring that the AI's use of data complies with all relevant privacy laws and regulations. It would also be important to ensure that the AI's recommendations are relevant and beneficial to community members by regularly reviewing and refining the AI's recommendation algorithms based on feedback from the community. Despite these challenges, the potential benefits of AI for community building and engagement are significant in creating a more connected, engaged, and vibrant community, enhancing the university experience for all members.

Intelligent, inexhaustible tutoring systems

Logically aligned with the previous scenarios, AI-powered tutoring systems that adapt to each student's needs, providing personalized guidance and support in real-time, is also an excellent future use of AI since current tutoring models are most often provided through in-house tutors and/or outsourced to private companies. While the current tutoring models provide valuable support to students, these services may not be available on-demand or at all hours, which could limit their effectiveness. Indeed, human tutors can fatigue and perhaps move from tutoring to doing the work *for* the student.

An intelligent, inexhaustible tutoring system could be available 24/7 for on-demand and interminable assistance. Inspired by systems like Khan Academy's Khanmigo (n.d.), this AI-powered tutor could provide students with immediate, personalized academic support. It could help students with various academic needs, from understanding complex concepts to providing feedback on assignments. It could adapt its teaching strategies based on each student's learning style and progress, providing a highly personalized learning experience. For example, if a student struggles with a particular concept, the system could provide additional explanations, examples, and practice problems. If a student makes a mistake, it could provide immediate feedback and suggest strategies for avoiding similar mistakes in the future. In addition to integrating AI into the existing systems at an institution, this type of AI would need to be trained using a combination of academic content from existing courses and data on effective tutoring strategies. Over time, as the AI interacts with students, it could learn and improve, becoming an increasingly effective tutor. Of course, this type of system would come with some potential downsides, chief among them ensuring the accuracy and effectiveness of its tutoring and student assistance. This could be addressed by having human tutors review and approve the first few sets of responses, and then over time, as it learns and improves, it could become more autonomous. Moreover, security and privacy data must be addressed like the other scenarios of integrating AI into existing university systems. Even with downsides and the need to protect student data, providing on-demand, personalized, and inexhaustible tutoring could enhance

student learning, improve academic outcomes, and contribute to a more equitable learning experience for all students.

AI-driven career support

With the end in mind, AI tools could be used in a university setting that analyzes students' skills, interests, previous work experiences, and academic performance to suggest suitable career paths and job opportunities and recommend relevant courses to help them achieve their career goals. At present, most universities have some type of dedicated team of career advisors that assist students with career skills, internship placements, and job opportunities. Some institutions may even have career-focused courses that are part of the curriculum at key points in a student's academic journey. While these resources provide valuable support to students, there may be opportunities to further enhance this support through the use of AI for more personalization and predictive features.

More specifically, an AI-driven career support system could complement the work of existing career advisors and enhance existing career-focused curricula. This AI-powered tool could provide a range of services to both students and the career department, including:

1) Career exploration: helping students explore potential career paths based on their interests, skills, previous work experiences, and academic focus; providing information on various careers, including job descriptions, required skills, and potential salary ranges.
2) Personalized career advice: providing personalized career advice based on each student's unique profile. For example, it could suggest specific internships, job opportunities, or additional courses that align with the student's career goals.
3) Resume and cover letter assistance: providing feedback on students' resumes and cover letters, suggesting improvements based on best practices, exemplars of those working in the intended career, and the specific requirements of each job application.
4) Interview preparation: helping students prepare for job interviews by providing common interview questions, suggesting responses, and offering feedback on their answers through a simulated and responsive two-way dialog.
5) Career trend analysis: analyzing job market trends to identify growing industries, in-demand skills, and emerging job roles. This information could help students make informed decisions about their career paths and help the career department tailor their services to meet changing needs.

Similar to other scenarios discussed in this section, AI would need to be integrated into the existing environment, and then the student data would need to be secured. From there, the AI would need to be trained using a combination of career-related data from the institution’s alum population, job market trends, and data on effective career advising strategies. Over time, as the AI interacts with students and the career department, it could learn and improve, becoming an increasingly effective career support tool. Like other applications discussed, it would be important to have human supervision as the tool is being implemented to ensure accuracy, but it could become more autonomous over time. The opportunity of providing personalized, on-demand career support could be a critical way of improving career outcomes for students and contributing to a more holistic and supportive learning and future earning potential.

Intelligent course development

While most scenarios generated through scenario-building and future mapping yielded results related to teaching and learning, particularly around the learning analytics framework at National Louis University, one scenario emerged that could significantly impact student learning–intelligent course development. Employing AI algorithms to analyze course content, previous student learning patterns, grade data, etc., to then recommend improvements, updates, or additional resources based on these data could lead to more engaging and effective course materials and overall course designs that lead to deeper student learning.

At present, developing courses at most universities can be a labor-intensive process, heavily reliant on instructional designers and faculty members. This process typically involves subject matter research, content creation, and course design, all requiring significant human time and effort. While this approach ensures a high level of expertise and quality, it may limit the speed of course development and the diversity of perspectives included in the course content. A future exists, however, where AI is not just an assistant in student learning and teaching but also an integral part of the course development team. AI could dive into the depths of the internet, academic databases, and even social media trends to bring together the most relevant, up-to-date, and diverse resources for course development. The AI could serve as a digital co-professor/subject-matter expert, working alongside the standard instructional designer and faculty member team. It could scan the latest research papers, articles, and online content related to the course subject, ensuring that the course content is not just current but cutting-edge, reflecting the latest developments and trends in the field. It could also analyze student feedback and performance (learning) data from previous course offerings, identifying patterns and trends that humans might miss. It could then suggest improvements or updates based on this analysis, essentially learning from each cohort of students to make the course better for the next one.

Moreover, AI could help ensure that multiple perspectives are represented in the course content and learning design. It could suggest resources from diverse authors and sources, promoting inclusivity and diversity in the learning material and not being influenced by common biases that humans often unconsciously develop over time. It could even identify gaps in the current content, such as underrepresented perspectives or overlooked topics, and suggest ways to fill these gaps. Course development could be a dynamic, iterative process, constantly evolving and improving with each cohort of students. The AI would not only accelerate this process but also enhance the quality, diversity, and relevance of the course content, creating a richer and more engaging learning experience for students.

Like previous scenarios, integration challenges, as well as privacy issues, would need to be safeguarded against, but so too, carefully tending to the potential biases that could emerge based on the information the AI has access to would need to be managed. It would also need to be tuned to the subject matter, level of the course, and needs of the students, as well as quality standards. All these potential downsides could be mitigated by ensuring that the instructional design team and/or the faculty member carefully review AI recommendations to ensure alignment and relevancy. Despite these challenges, the potential benefits of intelligent course development are significant. They cannot be overlooked as a critical enabler of quality teaching and learning–as a relative underpinning of the previous scenarios developed during this process. By leveraging AI, the university could accelerate course development, enhance the quality and diversity of course content, and ensure that its courses reflect the latest advancements in each

subject. This could revolutionize the course development process and improve student learning experiences.

Key Items for Consideration

The power of artificial intelligence (AI) lies in its ability to process vast amounts of information quickly and efficiently, enabling institutional leaders to extract valuable insights and make data-driven decisions. It has the power to automatically analyze complex datasets, identify patterns, and uncover hidden relationships. By harnessing the computational power of AI, institutions can gain a competitive advantage by unlocking actionable intelligence from their data.

The promise of AI is true even for colleges and universities that have already created disciplined data structures and operations. AI can potentially enhance an institution's capacity for data-driven decision-making by leveraging advanced algorithms and machine learning. AI systems can analyze and interpret data with exceptional speed and accuracy, empowering decision-makers to make better-informed choices and better serve their students, faculty, and staff. These AI-powered tools can identify patterns, trends, and correlations that might have otherwise gone unnoticed with exclusively human-based analyses, offering a deeper understanding of past performance and future possibilities. With the ability to process massive volumes of data in real time, AI can enhance decision-making by reducing human bias, providing predictive analytics, and optimizing resource allocation. AI could ostensibly unlock the full potential of an institution's data, resulting in more effective and efficient use of resources that could drive student success and innovation.

AI's strength in planning for the future

Using AI with and for future mapping and scenario planning involves leveraging the power of artificial intelligence to analyze large amounts of data and simulate possible future scenarios. Some of the strengths of using AI in this way include the following:

1) Data collection: gathering relevant data from various sources, such as historical data, real-time data feeds, surveys, and social media.
2) Machine learning and predictive modeling: using machine learning, predictive models can be developed using the collected data. These models can identify patterns, correlations, and trends, enabling predictions and projections to create multiple future possibilities.
3) Scenario generation and simulation: AI algorithms can generate and simulate multiple future scenarios based on the trained models.
4) Decision-making support: working in conjunction with human analysts, AI can assist with the decision-making processes in planning. It can also provide valuable recommendations, identify potential risks, and help prioritize actions based on the projected outcomes of different scenarios.
5) Iterative refinement: AI can continually refine and enhance future mapping and scenario planning by incorporating new data and feedback. This iterative process potentially improves the accuracy and reliability of future predictions and scenario planning.

AI limitations

While AI brings immense power to data and learning analytics, it also has certain limitations that higher education leaders must consider. One significant limitation is some AI models' "black box" nature. Deep learning algorithms, for instance, can produce highly accurate results, but interpreting how the conclusions are generated can be challenging. This lack of transparency can hinder trust and understanding, particularly when explanations and justifications for analytical outcomes are crucial or conclusions are counterintuitive to perceived expected outcomes.

Another limitation is the potential for biases in AI models and data. AI algorithms are only as good as the data they are trained on. If the training data contains biases or reflects societal prejudices, the AI models can perpetuate and amplify those biases. Furthermore, AI is incapable of ethical considerations in producing results. Ensuring fairness, transparency, and ethical considerations in AI-driven data analytics is a complex challenge that requires ongoing monitoring, evaluation, and mitigation strategies.

AI weaknesses in planning

Just as AI is effective in helping institutional leaders prepare for the future, there are also clear limitations that must be considered when using AI for future mapping and scenario planning. Key to all of these limitations is the need for human analysts to monitor the data being produced by AI closely. Some of the critical limitations include:

1) Data limitations: AI heavily relies on data availability and quality. Incomplete, biased, or insufficient data can lead to inaccurate predictions and flawed scenario planning.
2) Uncertainty and unpredictability: future events and circumstances can be highly uncertain and unpredictable. AI models may need help to account for unforeseen factors, sudden disruptions, or rare events that fall outside the scope of historical data.
3) Assumption-based modeling: AI models are built based on assumptions and simplifications. These assumptions might not fully capture the complexity and nuances of real-world scenarios, leading to limitations in accuracy and applicability.

Perhaps the two most critical limitations that institutional leadership should focus on, requiring intense human scrutiny, are the ethical considerations of and critical need for continued human creativity when engaging AI in enhancing data drive decision-making.

AI-based scenario planning requires careful consideration of ethical implications. Biases in data or models can perpetuate inequalities or favor certain groups while potentially excluding others. Decisions based solely on AI predictions may neglect human values, subjective judgments, and social dynamics. For an institution like National Louis University that has at its core the tenets of access and innovation, this limitation is a concern that requires extreme vigilance to ensure that the institution does not allow technological innovation to make decisions that harm the students that the institution serves.

Perhaps the most crucial element in utilizing AI in general, and for future planning specifically, is the critical nature of human interaction, both for the technical nature of integration and in supervising the outputs. While AI excels at data analysis and pattern recognition, it lacks the human intuition and creative problem-solving skills needed for nuanced scenario planning. Human expertise, insights, and humanity remain crucial in interpreting and contextualizing AI-generated results. Strong human engagement allows for an iterative process

that will generate positive results and allow an institution to look forward to implementing new business processes and innovation.

Conclusions

Through the use of AI-enabled scenario building and future mapping, NLU was able to identify unique ways to improve its existing learning analytics framework. While the current system has proven very effective at helping identify students' needs and highlighting where human intervention might be required, taking the time to build new scenarios and map different futures to continue improving the institution was an essential next step. Those new AI-generated scenarios have the potential to unlock opportunities which will allow the institution, and others, to begin planning for the future as AI continues to mature and evolve. Moreover, this intentional effort amplified the underlying feelings of the team that there was/is more that can be done to support learners in their academic journey better, whether that is through a more robust and accurate learning analytics framework or how that more informed framework could underpin new or enhanced a) personalized learning paths, b) virtual teaching assistants, c) community building and engagement, d) inexhaustible tutoring, e) career support, and d) intelligent course development.

Even with the considerable barriers related to the technical acumen needed to integrate AI, and the need for humans to supervise the output, even for a short time or perhaps forever, the promise of using AI to bolster the very heart of teaching and learning at an institution of higher education cannot be overlooked or disregarded. As institutions continue to operate in an increasingly competitive environment amidst shrinking demand and commoditization, they face the challenge of finding ways to better support their students. One potential solution is the integration of AI into existing student support and teaching and learning systems. By leveraging AI technology, these institutions have the opportunity to create a virtuous cycle. They can build a strong reputation for student outcomes, which in turn fosters a quality culture that prospective students actively seek out.

The integration of AI can also contribute to strengthening academic progression. For example, at an institution that has proven itself to be laser-focused on student success through the use of learning analytics and AI integration, even non-degree seeking students could potentially progress through doctoral-level studies. This level of support and innovation opens up new possibilities for students to achieve their educational goals, regardless of their starting point. Further, institutions under extreme pressure to cut costs and keep quality high could turn to technology, such as AI, as a critical enabler to this paradox.

Moreover, the pace and tide of technological innovation will continue, and AI may catalyze an even faster adoption cycle than in previous years. Universities and colleges that fail to recognize and embrace this type of change environment could be quickly left behind as students become increasingly discerning and the economy looks for better-skilled employees upon graduation. Institutional leaders can, even today, capitalize on the availability of AI and use AI platforms such as ChatGPT to build scenarios and perform future mapping to explore the possible opportunities to improve their existing learning analytics environments or even create those environments.

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