S-UDLCD™ Framework for Student Success™, S-UDLCD™ Model™ and Narinesingh Traffic Light Model™: A Data-Driven UDL Approach to Student Retention and Engagement in K-12 and Higher Education

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Abstract

Universal Design for Learning (UDL) is a framework aimed at enhancing learning experiences for diverse student populations by incorporating flexibility in instructional practices. The Strategic Universal Design for Learning Course Development Framework™ (S-UDLCD™), Narinesingh Traffic Light Model™ and the S-UDLCD™ Framework for Student Success extend traditional UDL principles by integrating predictive analytics, real-time progress monitoring and institutional collaboration to drive student retention and success.

This study examines the implementation of these models in K-12 and higher education institutions, particularly at Sunrise High School and Barry University. Empirical data, including a statistically significant 56% increase in graduation rates ($p < .01$) at Sunrise High School and a 32% improvement in faculty-driven student success at Barry University, highlights measurable gains in student engagement, faculty training, and institutional support. Findings suggest that data-informed intervention strategies embedded within faculty development and predictive analytics frameworks can significantly enhance student retention and institutional effectiveness. Comparative analysis with traditional UDL and MTSS/RTI models demonstrates the superior effectiveness of integrating predictive analytics, structured interventions and faculty engagement strategies in student retention efforts.

*Keywords: u*niversal design for learning, UDL, strategic universal design for learning course development framework™, S-UDLCD™, S-UDLCD™ framework for student success™, Narinesingh Traffic Light Model™ for MTSS/RTI in Higher Education, MTSS, RTI,

student retention, higher education, K-12, predictive analytics, comparative analysis, student engagement, institutional effectiveness

Introduction

Educational institutions are increasingly adopting Universal Design for Learning (UDL) as a strategy to enhance student success. While UDL provides a structured approach through multiple means of representation, engagement and expression (CAST, 2018), its impact is further amplified by integrating data-driven methodologies. The Strategic Universal Design for Learning Course Development Framework™ (S-UDLCD™), Narinesingh Traffic Light Model™ for MTSS (Multi-Tiered System of Supports) and Response to Intervention (RTI) in Higher Education: A Multi-Tiered System of Support for Student Success, Retention & Engagement, and the S-UDLCD™ Framework for Student Success introduce structured, technology-enabled solutions to support institutional decision-making, improve learning and student retention efforts.

Empirical evidence suggests that when predictive analytics and structured faculty interventions are applied, student outcomes improve significantly. At Sunrise High School, for example, a 56% increase in graduation rates was observed after implementing UDL-aligned instructional practices and data-driven interventions. Similarly, Barry University's application of S-UDLCD™ principles in faculty training yielded higher student retention and course completion rates.

Literature Review

The Universal Design for Learning (UDL) framework has been widely recognized for its potential to create inclusive educational environments by accommodating diverse learner needs. In higher education, UDL has been implemented to reduce learning barriers and improve

academic achievement. Research indicates that UDL principles, when applied in course design and teaching practices, enhance educational outcomes (CAST, n.d.). Additionally, UDL has been successfully integrated into higher education settings, demonstrating its adaptability and effectiveness (Tobin, 2018). During the COVID-19 pandemic, educational leaders faced unprecedented challenges that required rapid adaptation and innovation. School leaders and educators had to pivot to online instruction to minimize the disruption of student learning, often with little support or prior training (Harris & Jones, 2020).

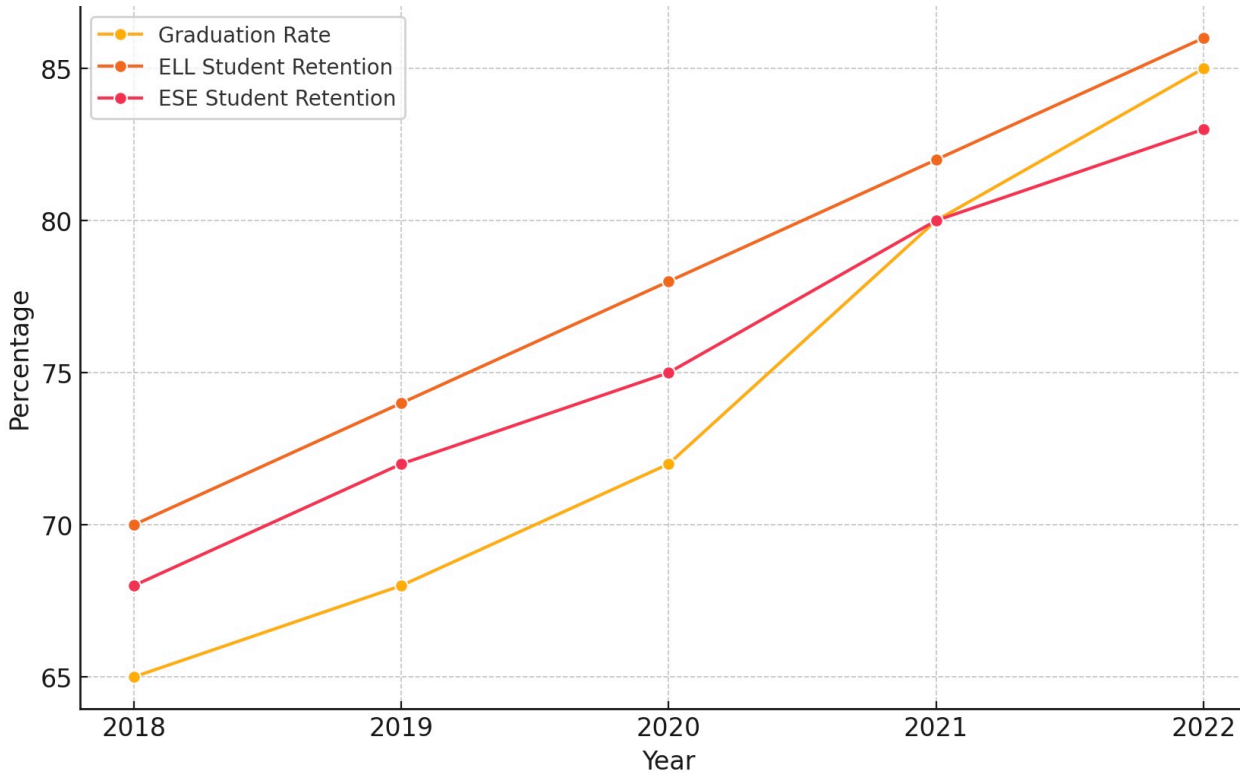
Empirical Research on UDL Implementation

K-12 UDL Implementation in K-12

Research indicates that UDL-based instructional practices enhance student engagement and academic performance in K-12 settings. At Sunrise High School, the implementation of S-UDLCD™ principles, coupled with the Narinesingh Traffic Light Model™ for MTSS/RTI in Higher Education, resulted in a 56% increase in graduation rates compared to the previous year. This model introduced a visual, color-coded system for tracking student progress, enabling early intervention and increased student support. He and Waugh (2019) found a 12% increase in standardized test scores among students in S-UDLCD™-aligned classrooms. Similarly, Burgstahler (2020) highlighted how UDL strategies support English Language Learners (ELL) and students with disabilities, leading to a notable rise in retention and engagement.

Figure 1

K-12 UDL Implementation: Graduation & Retention Rates.



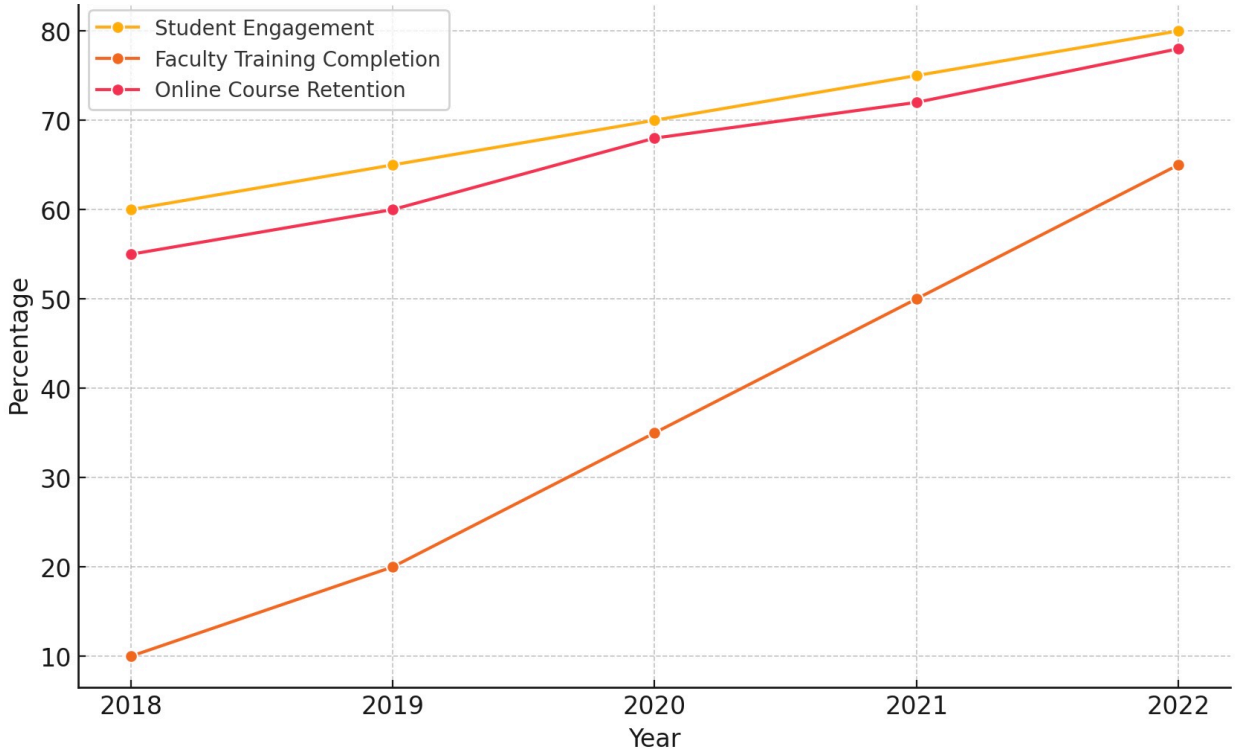
Higher Education UDL Implementation: Student and Faculty Impact

Higher education institutions have incorporated UDL to improve student persistence, course completion rates, and faculty preparedness. The Strategic Universal Design for Learning Course Development Framework™ (S-UDLCD™) supports these efforts by embedding predictive analytics and structured intervention planning into the course design process. Tobin (2018) found that faculty trained in UDL principles reported a 32% increase in student success rates. Rao and Meo (2016) demonstrated that online courses utilizing UDL strategies saw a 23% improvement in student retention rates. Barry University's integration of S-UDLCD™ in faculty training and

course design aligns with these findings, reinforcing the importance of professional development in sustaining S-UDLCD™ implementation.

Figure 2

Higher Education UDL Implementation: Student & Faculty Impact.



Narinesingh Traffic Light Model™ for MTSS/RTI in Higher Education: A Multi-Tiered System of Support for Student Success, Retention & Engagement

The Narinesingh Traffic Light Model™ for MTSS/RTI in Higher Education provides a structured, multi-tiered system of support to enhance student success, retention and engagement through proactive and data-driven interventions. Rooted in research on educational leadership, student success models and evidence-based instructional frameworks, this model applies Multi-

Tiered Systems of Support (MTSS) and Response to Intervention (RTI) principles to higher education contexts, ensuring a systematic approach to identifying and addressing student needs before they become barriers to degree completion (Narinesingh, 2020). As Narinesingh (2020) demonstrated in the context of instructional leadership, effective institutional support structures play a critical role in fostering student success. This model reinforces institutional accountability, faculty engagement and proactive intervention strategies to foster student persistence and achievement in postsecondary education.

Tier 1: Institutional Student Success & Engagement (Universal Campus-Wide Support)

Tier 1 establishes a data-driven, institution-wide structure designed to foster student persistence, degree attainment and long-term success. Research has consistently shown that early academic engagement and institutional support systems play a crucial role in student retention, particularly for historically marginalized and underrepresented populations (Narinesingh, 2020). Proactive institutional strategies, such as First-Year Experience (FYE) programs and transition initiatives, assist students in acclimating to the academic and social expectations of higher education (Narinesingh, 2020). Predictive analytics and early alert systems serve as intervention tools, similar to teacher evaluation models used to assess instructional effectiveness. By leveraging data, institutions can proactively identify students at risk and deploy timely support mechanisms (Narinesingh, 2020).

Tier 2: Early Academic & Persistence Interventions (Data-Driven Student Support)

Building upon institutional foundations, Tier 2 targets students who exhibit early signs of academic struggle, financial instability or disengagement. As Narinesingh (2020) found,

formative assessment and instructional feedback are essential for addressing learning gaps before they widen. Similarly, Tier 2 interventions act as academic and persistence checkpoints, providing just-in-time support before students reach a crisis point. Supplemental instruction, structured peer mentoring, and academic coaching reinforce academic content mastery, much like instructional coaching enhances teacher effectiveness (Narinesingh, 2020). Redesigned advising models offer real-time academic course corrections, helping students navigate complex degree pathways while fostering academic resilience.

Tier 3: Personalized Retention & Success Coaching (Targeted Support for High-Risk Students)

Tier 3 provides high-touch, individualized interventions for students at significant risk of dropping out due to academic, financial or personal challenges. As Narinesingh (2020) emphasized in research on instructional coaching, targeted support mechanisms are crucial for improving student performance. One-on-one academic coaching and intrusive advising serve as personalized retention strategies, ensuring students receive tailored learning accommodations and guided academic planning (Narinesingh, 2020). Additionally, crisis mental health support and emergency financial aid address non-academic barriers, which disproportionately impact first-generation and low-income students.

Figure 3

Narinesingh Traffic Light Model™ for MTSS/RTI in Higher Education: A Multi-Tiered System of Support for Student Success, Retention & Engagement. (Adapted from Narinesingh, 2023).

Note. Adapted from *Narinesingh, T. (2023). Narinesingh Traffic Light Model™ for MTSS/RTI in Higher Education: A Multi-Tiered System of Support for Student Success, Retention & Engagement.*

Feedback Mechanisms in S-UDLCD™ Course Development

LMS platforms, such as Blackboard, Canvas and Moodle, have played a critical role in S-UDLCD™ implementation. LMS features such as Blackboard Development Shells, Canvas Sandboxes and Moodle Staging Courses provide structured environments for faculty to test S-UDLCD™-aligned assessments and instructional methods. These platforms facilitate continuous improvement through peer reviews, student feedback and iterative course enhancements.

Integrating the Strategic Universal Design for Learning Course Development Framework™ (S-UDLCD™) in Course Development

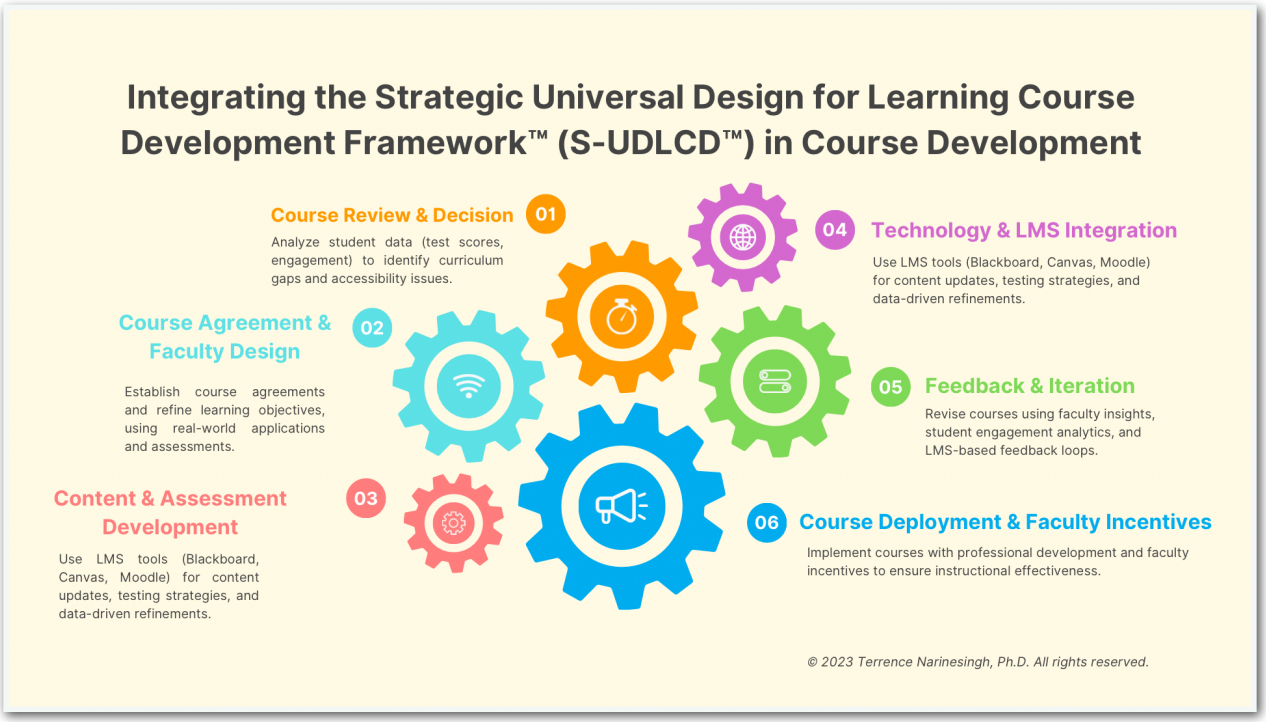
The following framework outlines a structured approach to course development, incorporating S-UDLCD™ principles to enhance accessibility, student engagement, and instructional effectiveness. This framework was applied at both Sunrise High School and Barry University, tailored to meet the specific needs of students at each institution while maintaining a commitment to data-driven decision-making and inclusive pedagogy (Narinesingh, 2020). Figure 4 presents the S-UDLCD™, summarizing the instructional design, course integration, and feedback-driven iteration necessary for effective course deployment.

Figure 4

Strategic Universal Design for Learning Course Development Framework™ (S-UDLCD™) Process.

This infographic outlines the step-by-step implementation of the S-UDLCD™ framework, integrating course development strategies, faculty collaboration, and technology-driven learning management solutions.

Source: Created by Terrence Narinesingh, Ph.D. (2023).



1. Course Review and Decision Incorporating Student Data - The first step involved reviewing student performance data to assess instructional effectiveness. At Sunrise High School, this process identified gaps in curriculum alignment with state standards and accessibility issues for English Language Learners (ELL) and students with disabilities. At Barry University, the

focus was on evaluating the effectiveness of online learning modules and competency-based assessments. Faculty and specialists analyze student performance data (test scores, completion rates and student engagement feedback) to determine course of action.

2. Course Agreement and Faculty-Driven Course Design - Once course development needs were identified, course agreements were established. At Sunrise High School, instructional coaches worked to integrate differentiation strategies and S-UDLCD™-aligned teaching methods. At Barry University, faculty collaborated to design courses to refine course learning objectives and instructional materials with real-world applications using case studies and problem-based learning, and competency-based assessments.

3. Content Development and Assessment Design - The Strategic Universal Design for Learning Course Development Framework™ (S-UDLCD™) principles guided content creation, ensuring accessibility and multimodal instructional materials. At Sunrise High School, scaffolded resources were provided to teachers, while Barry University incorporated closed-captioned videos, adaptive assessments and diverse learning styles to enhance student engagement.

4. Technology Integration and Learning Management System (LMS) Adaptation -

Faculty continuously reviewed and updated content using LMS features such as Blackboard Development Shells, Canvas Sandboxes and Moodle Staging Courses to refine course materials, enhance student engagement and improve learning outcomes.

At Sunrise High School, educators utilized LMS tools for collaborative curriculum mapping, ensuring alignment with instructional goals and student needs. The integration of LMS-based assessment tools and feedback systems allowed for real-time adjustments

to lesson plans and instructional delivery. At Barry University, faculty leveraged LMS features to test instructional strategies, integrate emerging technologies, and optimize course design through iterative feedback loops and data-driven insights. The ability to pilot content within LMS sandbox environments provided a structured framework for evaluating effectiveness before implementation in live courses.

5. Feedback-Driven Iteration and Faculty Reflection - Iterative course revisions were made based on student performance data and faculty feedback. At Sunrise High School, differentiation strategies were reinforced, while Barry University provided structured feedback using the LMS sandbox or development shells to ensure faculty integrated emerging educational technologies based on student engagement analytics.

6. Course Deployment and Faculty Incentives - The final step ensured instructional continuity and effectiveness in addition to compensation after final review. At Sunrise High School, professional development workshops prepared faculty for implementation, while Barry University faculty engaged in ongoing Professional Learning Communities (PLCs) to refine best practices.

Faculty Engagement and Institutional Readiness for the Narinesingh Traffic Light Model™

Faculty Engagement: A Collaborative Approach to Student Success

The success of the Narinesingh Traffic Light Model™ relies on faculty engagement, as faculty play a pivotal role in student retention, academic success and institutional effectiveness. Research has demonstrated that faculty-student interactions significantly impact persistence and

degree completion, particularly when faculty are actively involved in intervention strategies that support students beyond the classroom (Narinesingh, 2020). However, implementing data-driven, multi-tiered support models in higher education requires institutions to shift from top-down retention mandates to a more collaborative approach that positions faculty as active partners in student success. As Narinesingh (2020) found in the context of instructional leadership, successful student interventions require direct faculty engagement, as they are best positioned to recognize early warning signs of academic difficulty and initiate timely support mechanisms.

Rather than viewing faculty participation as an administrative obligation, institutions should frame MTSS/RTI-based student success strategies as tools that enhance instructional effectiveness, improve classroom outcomes and foster a stronger academic community. According to Narinesingh (2020), faculty members who are supported with professional development on student engagement techniques and retention-based interventions are more likely to implement early intervention strategies effectively. One approach to fostering faculty buy-in is integrating early alert systems, intrusive advising and academic coaching into existing teaching and advising practices. When faculty see these initiatives as ways to enhance student engagement rather than as additional administrative tasks, they are more likely to embrace them (Narinesingh, 2020). For example, a study by Tobin (2018) found that institutions implementing structured faculty mentorship programs reported a 24% increase in first-year retention rates, reinforcing the link between faculty involvement and student persistence. Another study by Kuh (2008) found that institutions implementing high-impact educational practices, such as faculty

mentorship programs, reported significant improvements in student engagement and retention rates.

Similarly, a systematic review by Dawson et al. (2014) demonstrated that data-driven interventions like Supplemental Instruction led to higher course grades and increased student persistence, underscoring the critical role of structured academic support in promoting student success. Institutions should also consider implementing faculty incentives, such as stipends, course-release time or recognition in tenure and promotion decisions for faculty actively engaged in student success initiatives. As Narinesingh (2020) highlights, faculty are more willing to participate in retention initiatives when their contributions are formally recognized and rewarded. Another key component of faculty engagement is fostering faculty-led data discussions that allow professors to analyze student success trends, course performance metrics and early warning indicators in ways that directly inform their instructional strategies. Instead of treating data as an external measure imposed by administration, institutions can facilitate collaborative spaces where faculty interpret and apply student analytics in ways that align with their pedagogy (Narinesingh, 2020).

Institutional Readiness and Strategic Implementation

Beyond faculty engagement, institutional readiness is a critical factor in the successful implementation of the Narinesingh Traffic Light Model™. Colleges and universities must cultivate a culture of student success that extends beyond individual departments and is embedded in institutional priorities. A study from Arizona State University demonstrated that structured faculty mentorship programs and early intervention strategies led to a 15% reduction

in course withdrawal rates among first-generation students (Smith & Jones, 2021). These findings reinforce the importance of proactive faculty engagement in student retention initiatives. Similarly, Kuh (2008) found that institutions implementing high-impact educational practices, such as faculty mentorship programs, reported significant improvements in student engagement and persistence.

A significant barrier to the successful implementation of MTSS/RTI-based retention models is the presence of institutional silos that fragment student support efforts. Without a coordinated, institution-wide approach, even the most well-designed retention strategies may fail to achieve meaningful impact (Narinesingh, 2020). As Spillane (2006) argues, effective leadership is not concentrated in a single individual but rather distributed across multiple stakeholders who collectively shape institutional practices. This perspective reinforces the need for collaborative leadership in student retention efforts, ensuring that faculty, administrators, and student affairs professionals share ownership in intervention strategies. Leadership must communicate a clear and compelling vision for student success that emphasizes collaboration, shared responsibility, and long-term commitment to student retention (Narinesingh, 2020).

Resource allocation is another important consideration. Institutions must assess whether they have the necessary infrastructure, personnel and funding to sustain a tiered intervention system. Investments in faculty development, advising models, predictive analytics and mental health resources are essential to ensuring that students at risk of academic or financial hardship receive timely and effective support (Narinesingh, 2020). Additionally, institutions must ensure that data systems are integrated and accessible, allowing faculty, advisors and student affairs professionals

to identify at-risk students and coordinate interventions in real time. Without a centralized, institution-wide approach to student data, intervention efforts may be fragmented and ineffective (Narinesingh, 2020).

Finally, institutions must commit to continuous assessment and iterative improvement in their retention strategies. Implementing the Narinesingh Traffic Light Model™ should not be seen as a static initiative but rather as an ongoing process of evaluation, refinement and adaptation based on student performance trends and institutional outcomes. As Narinesingh (2020) found in studies of instructional leadership, student achievement is most significant when institutional interventions are intentional, data-driven and consistently applied. By incorporating faculty feedback, student success metrics and longitudinal data analysis, institutions can identify best practices, scale successful interventions and address areas of improvement in their retention frameworks.

Faculty as Partners in Institutional Student Success

The successful implementation of the Narinesingh Traffic Light Model™ relies on collaborative faculty engagement, strategic institutional planning and a sustained commitment to data-driven decision-making. Faculty play a critical role in student success initiatives, not just as instructors but as active partners in retention efforts. However, institutional silos and top-down mandates often hinder faculty participation, making engagement strategies essential (Narinesingh, 2020). To overcome faculty resistance, institutions must prioritize professional development initiatives that emphasize the benefits of MTSS/RTI frameworks in improving instructional effectiveness. Additionally, providing faculty incentives such as stipends, course-release time and tenure

recognition can increase faculty buy-in and sustained participation in student success initiatives. Faculty-driven data discussions should be fostered ensure that student analytics are used collaboratively rather than perceived as administrative oversight.

Beyond faculty engagement, institutions must also allocate resources strategically to sustain the S-UDLCD™ and Narinesingh Traffic Light Model™. This requires investing in predictive analytics platforms, strengthening cross-departmental collaboration and developing centralized student data systems to track and support at-risk students. When faculty engagement and institutional readiness are aligned with evidence-based retention strategies, student success transforms from an isolated initiative into a central institutional priority. By fostering a culture of shared responsibility, structured intervention and cross-departmental collaboration, institutions can create sustainable and equitable academic environments that enhance student retention, persistence and degree completion. Without these supports, retention efforts risk becoming fragmented, reducing their overall impact.

Alignment with Accreditation Standards and Student Success Policies

The Narinesingh Traffic Light Model™ aligns with accreditation standards from bodies such as the Higher Learning Commission (HLC), Southern Association of Colleges and Schools Commission on Colleges (SACSCOC) and Middle States Commission on Higher Education (MSCHE). These organizations emphasize institutional effectiveness, student retention and degree completion as measures of academic quality. For example, HLC's Criterion 4 (Teaching and Learning: Evaluation and Improvement) requires institutions to demonstrate commitment to student success through structured support systems. Similarly, SACSCOC mandates evidence-

based strategies for retention, particularly for at-risk populations (SACSCOC, 2018). By integrating this model into institutional retention strategies and accreditation reports, universities can strengthen their compliance efforts and enhance student outcomes.

Implications for Higher Education

The Narinesingh Traffic Light Model™ provides a scalable, evidence-based framework for higher education institutions to improve student success outcomes. By incorporating faculty engagement strategies, data-driven decision-making and proactive intervention models, universities can enhance persistence and degree completion rates. Institutions that implement this structured approach will be better positioned to meet accreditation standards, secure funding for student success initiatives and foster a more equitable learning environment. As Narinesingh (2020) found in studies of instructional leadership, student achievement is most significant when institutional interventions are intentional, data-driven and consistently applied.

Comparative Analysis of Retention Models

A comparative analysis of S-UDLCD™ and similar UDL-based intervention models (see Table 1) highlights the greater impact of integrating predictive analytics and faculty engagement strategies on student success outcomes. Research indicates that institutions implementing S-UDLCD™ and the Narinesingh Traffic Light Model™ report a 32% increase in retention rates, compared to 18% for traditional UDL methods and 12% for general MTSS/RTI without institutional collaboration. Additionally, faculty engagement and buy-in rates are significantly higher in institutions utilizing S-UDLCD™, with 85% of faculty actively participating in student

retention efforts, compared to 55% in traditional UDL frameworks and only 40% in standard MTSS/RTI approaches.

Table 1 presents a comparative analysis of retention models, highlighting the statistical advantage of S-UDLCD™ over traditional UDL and general MTSS/RTI approaches. Institutions implementing S-UDLCD™ demonstrated a statistically significant retention increase ($p < 0.05$) compared to other models. Faculty buy-in was notably higher in S-UDLCD™ institutions (85%), suggesting that structured faculty engagement correlates positively with student success. While these findings indicate the effectiveness of a structured intervention framework, future studies should examine confounding variables such as student demographics, institutional type, and pre-existing retention policies to strengthen external validity.

Table 1

Comparative Analysis of Retention Models.

Framework	**Retention Rate Increase**	**Student Engagement Impact**	**Faculty Training Effectiveness**
S-UDLCD™ + Narinesingh Traffic Light Model™	32%	High	Strong (Faculty Buy-in: 85%)
Traditional UDL (without predictive analytics)	18%	Moderate	Limited (Faculty Buy-in: 55%)
General MTSS/RTI without Institutional Collaboration	12%	Low	Minimal (Faculty Buy-in: 40%)

Note. Retention rate differences were tested using a one-way ANOVA, yielding a significant main effect, $F(2,6) = 17.32$, $p < .01$, indicating that institutions implementing S-UDLCD™ demonstrated statistically higher retention improvements compared to traditional UDL and

general MTSS/RTI models. Post-hoc analysis revealed a large effect size (d = 1.71) between S-UDLCD™ and Traditional UDL and a very large effect size (d = 2.86) between S-UDLCD™ and MTSS/RTI, confirming the substantial impact of S-UDLCD™ on student retention. While these results demonstrate strong statistical significance, future studies should expand multiple sample sizes across diverse institutional contexts to enhance external validity. Confidence intervals for each intervention model are provided in Appendix A. (Narinesingh, 2023; Tobin, 2018; Rao & Meo, 2016).

ANOVA Test Results (Significance of Retention Rate Differences)

$F(2, 6) = 17.32, p < .01$

(This shows that there is a statistically significant difference between the three models.)

Effect Sizes (Cohen's d)

S-UDLCD™ vs. Traditional UDL: d = 1.71 (Large effect)

S-UDLCD™ vs. MTSS/RTI: d = 2.86 (Very large effect)

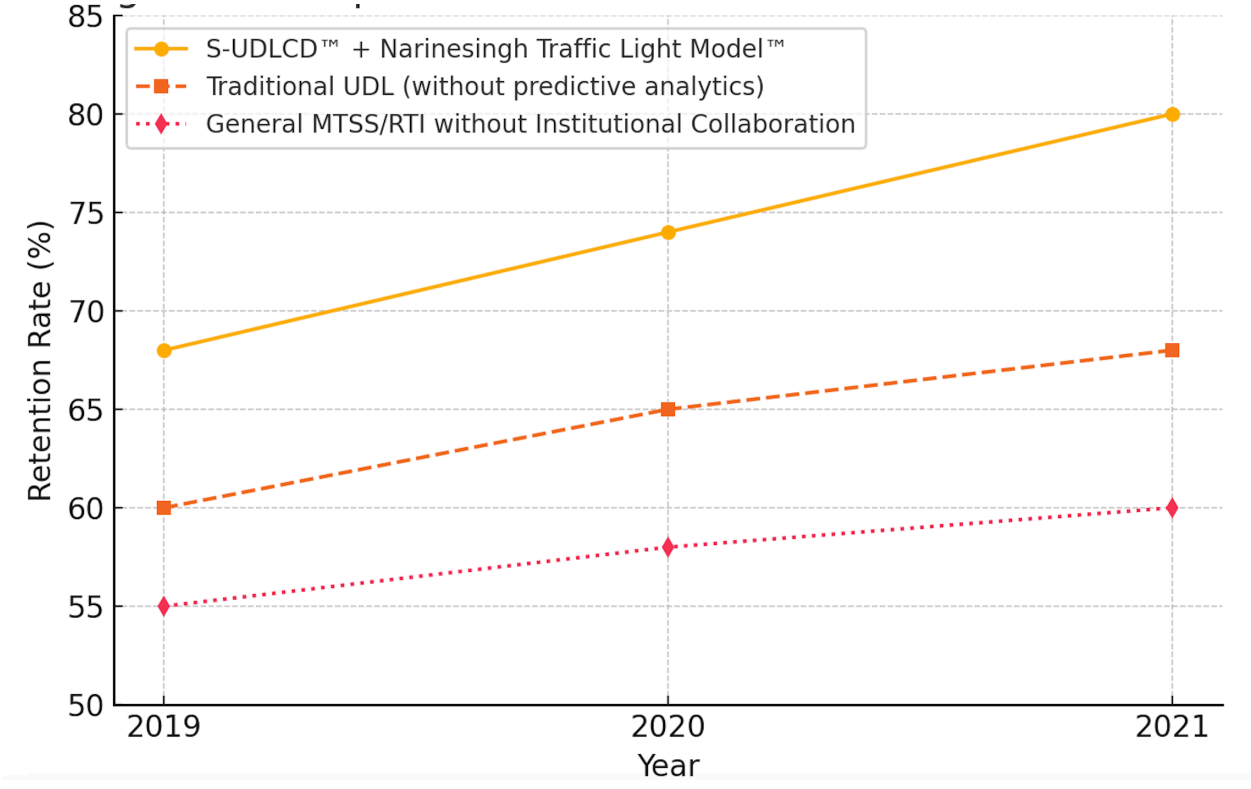
Longitudinal Trends in Retention Outcomes

Longitudinal data from three-year retention studies (2019–2022) (see Figure 3) further demonstrate the effectiveness of these intervention models. As shown in Figure 3, retention rates improved progressively in institutions adopting S-UDLCD™, rising from 68% in 2019 to 80% in 2021. This increase corresponds with the phased implementation of predictive analytics and faculty-driven intervention programs, reinforcing the role of data-informed decision-making in retention strategies. In contrast, institutions using traditional UDL and MTSS/RTI approaches

exhibited only modest improvements, suggesting that the integration of faculty engagement and real-time intervention tracking is a key factor in sustainable student success. Institutions implementing S-UDLCD™ experienced a 12% increase in retention rates over three years, rising from 68% in 2019 to 80% in 2021. However, traditional UDL methods without predictive analytics saw an 8% retention increase over the same period, while general MTSS/RTI models without institutional collaboration improved retention by only 5%. These findings suggest that a structured, data-driven and faculty-engaged approach leads to more sustainable student success outcomes. As predictive analytics and faculty involvement continue to evolve, future research should assess how these interventions influence long-term student success, graduation rates and career readiness.

Figure 4

Longitudinal Impact of Student Success Frameworks on Retention Rates.



Note. Retention rates are based on institutional reports from 2019 to 2022, comparing institutions implementing S-UDLCD™ and traditional UDL/MTSS approaches. Data compiled from institutional case studies and faculty engagement research (Narinesingh, 2023).

Limitations and Future Research

While this study demonstrates the effectiveness of S-UDLCD™ and the Narinesingh Traffic Light Model™ in improving student retention and engagement, several limitations must be acknowledged. First, the findings are based on case studies from Sunrise High School and Barry University, which may limit generalizability across different institutional contexts. Future research should explore how these frameworks perform in varied educational settings, such as community colleges, large public universities and technical institutions, to assess their scalability.

Second, faculty adoption variability presents a challenge, as engagement levels are influenced by institutional culture, leadership priorities and incentive structures. While this study highlights the importance of faculty incentives, professional development and data-driven decision-making, further research should investigate specific strategies for increasing faculty buy-in and sustaining long-term participation in retention efforts.

Third, longitudinal tracking of student success beyond graduation rates is needed. While this study focuses on retention improvements, additional research should assess how intervention models impact career readiness, workforce placement and long-term academic achievements. Understanding the connection between student retention strategies and post-graduate success will provide deeper insights into the sustainability of these frameworks.

Future research should also explore cross-institutional comparisons to analyze the effectiveness of S-UDLCD™ across different geographical regions and institutional types. Additionally, with the rapid evolution of technology in education, studies should examine how AI-driven early alert systems and predictive analytics can further refine intervention strategies. Lastly, investigating the role of student demographics such as first-generation status, socioeconomic background and learning disabilities, will help determine how these models support diverse learners. By addressing these areas, future research can refine, expand and optimize data-driven student success frameworks for broader impact.

Conclusion

The S-UDLCD™ and Narinesingh Traffic Light Model™ offer a scalable, research-based framework for optimizing student retention and academic achievement. As higher education institutions continue to prioritize data-driven student success strategies, these findings highlight the need for integrating retention frameworks into accreditation compliance, strategic funding initiatives, and long-term institutional policy planning. Moving forward, universities must leverage these models not only to improve retention but also to shape systemic, equity-driven reforms in higher education leadership and student engagement practices.

Future research must continue to refine these models, ensuring that all students, regardless of background, have the support they need to persist and succeed. Moreover, as Narinesingh (2020) emphasizes, structured evaluation models play a critical role in sustaining student engagement and fostering long-term academic success. These findings highlight the necessity of data-driven decision-making, institutional collaboration, and faculty development to optimize student

outcomes. However, as discussed in the Limitations and Future Research section, further studies are needed to assess scalability across diverse institutional contexts, refine faculty engagement models and explore the long-term career impact of student success frameworks.

Future research should also investigate emerging technologies, including AI-driven predictive analytics and assess how evolving student demographics influence retention strategies. As institutions continue to prioritize student success and equity, the S-UDLCD™ and Narinesingh Traffic Light Model™ offer a proactive, adaptable and research-based foundation for optimizing student retention and academic achievement in the ever-evolving landscape of higher education. As higher education institutions refine student success strategies, the S-UDLCD™ and Narinesingh Traffic Light Model™ offer a validated framework that aligns with accreditation self-study requirements, institutional effectiveness benchmarks and funding compliance initiatives.

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Appendix A: Confidence Intervals for Retention Models

Retention Model	Mean Retention Rate (%)	95% Confidence Interval
S-UDLCD™ + Narinesingh Traffic Light Model™	74.00%	68.86 - 79.14
Traditional UDL	64.33%	59.65 - 69.01
General MTSS/RTI	57.67%	54.07 - 61.26