International Research Journal on Advanced Engineering and Management
https://goldncloudpublications.com
https://doi.org/10.47392/IRJAEM.2026.0070
e ISSN: 2584-2854
Volume: 04 Issue: 03
March 2026
Page No: 448 - 452

UniConnect: A Framework for Smart University Automation Using MCP and LLM

Mital Kadu[1], Vibhavari Jawale[2], Avinash Shinde[3], Keshavraj Pore[4], Nikhil Ghule[5], Rushabh Doshi[6]
[1,2]Assistant Professor, Department of Artificial Intelligence and Data Science, Dr. D. Y. Patil Institute of Engineering, Management and Research, Pune, Maharashtra, 412105, India
[3,4,5,6] Undergraduate Student, Department of AI & DS, DYPIEMR, Pune, Maharashtra, 412105, India
Emails: *dypmitalkadu@gmail.com[1], Vibhavarijawale175@gmail.com[2], avinash106shinde@gmail.com[3], keshavrajpore52@gmail.com[4], nikhilghule87@gmail.com[5], rushabhdoshi18113@gmail.com[6]*

Abstract
Managing a university involves handling various interconnected tasks like student admissions, academic scheduling, resource allocation, and communication across departments. Traditional systems often struggle because they operate in isolated silos, making it difficult to share information seamlessly. This fragmentation leads to inefficiencies and frustration for students, faculty, and administrators alike. Our paper explores a new approach to university management through UniConnect, a system that brings together Large Language Models and the Model Context Protocol to create a more unified experience. By using natural language processing, UniConnect allows users to interact with university systems conversationally, making complex tasks simpler and more intuitive. The Model Context Protocol acts as a bridge, connecting different university databases and services without requiring them to be rebuilt from scratch. This means that existing systems can work together more effectively. We examine how this integration can improve daily operations, from course registration to resource management, while maintaining data security and user privacy. Our review discusses both the potential benefits and practical challenges of implementing such a system in real university environments. We look at how artificial intelligence can make administrative processes smoother while still keeping the human element central to education. The goal is to show how technology can support, rather than replace, the essential relationships that make universities thrive.

Keywords: *AI in education; Large language models; Model context protocol; Smart campus; University automation*

1. Introduction
Running a university involves juggling numerous responsibilities that all need to work together smoothly. From processing student applications and managing course schedules to allocating resources and handling finances, every activity affects students, faculty, and staff. The traditional approach of using separate systems for each function has created a patchwork of disconnected tools that make simple tasks unnecessarily complicated. Think about what happens when a student tries to register for classes. They might need to check one system for course availability, another for prerequisite requirements, a third for their academic transcript, and yet another to verify financial clearance. Each system requires separate login credentials and presents information differently. This scattered approach wastes time and creates opportunities for errors and confusion. Recent developments in artificial intelligence, particularly Large Language Models, have opened new possibilities for how people interact with computer systems. Instead of navigating through multiple menus and forms, users can now describe what they need in plain language. This technology understands context and nuance in ways that previous systems couldn't manage. At the same time, the Model Context Protocol has emerged as a standardized way to connect these intelligent systems with existing databases and tools. Despite these advances, significant gaps remain in existing university automation systems. Most platforms lack proper

International Research Journal on Advanced Engineering and Management
https://goldncloudpublications.com
https://doi.org/10.47392/IRJAEM.2026.0070
e ISSN: 2584-2854
Volume: 04 Issue: 03
March 2026
Page No: 448 - 452

standards for exchanging data between departments. When integration does occur, it usually involves custom programming that becomes difficult to maintain over time. The intelligent assistants currently deployed often handle only simple, frequently asked questions. They struggle with complex queries that require pulling information from multiple sources or understanding institutional policies in context. This paper proposes UniConnect as a response to these limitations. Rather than treating university systems as separate entities that occasionally need to communicate, we envision them as interconnected parts of a unified whole. The Model Context Protocol provides the technical foundation for this integration, while Large Language Models offer an interface that feels natural to use. Together, these technologies can transform how universities operate not by replacing existing systems, but by helping them work together more effectively.

2. Method

Our approach to developing the UniConnect framework involved several interconnected phases, each designed to address specific aspects of university automation while maintaining focus on real world applicability and user needs. We began by conducting extensive research into existing university management systems, examining their architectures, capabilities, and limitations. This involved reviewing academic literature on educational technology, analyzing commercial ERP platforms used in higher education, and studying recent implementations of AI powered educational tools. We paid particular attention to systems that had attempted integration across multiple university functions, seeking to understand both their successes and their challenges. Through discussions with students, faculty, and administrative staff at our institution, we identified common pain points in daily university operations. Students highlighted frustrations with scattered information sources and the difficulty of getting timely answers to questions. Faculty members described the administrative burden of routine tasks like attendance tracking and answering repetitive student queries. Administrators expressed challenges in generating comprehensive reports and making data driven decisions when information resided in separate systems. Based on our research and requirements analysis, we designed a layered architecture that balances several competing concerns: the need for standardization with the requirement for flexibility, the benefits of centralization with the advantages of modular design, and the power of automation with the importance of human oversight. The architecture places the Model Context Protocol as the foundation for system integration, with Large Language Models providing the natural language interface layer above it. We designed the framework to remain technology-agnostic where possible, allowing institutions to choose implementations that match their specific needs, resources, and constraints. The MCP protocol's standardization makes it feasible to swap different LLM providers or upgrade to newer models without fundamentally redesigning the system. For the MCP servers themselves, we selected programming languages and frameworks that balance developer familiarity with performance requirements. Rather than attempting to replace existing university systems, we designed UniConnect to work alongside them. This pragmatic approach acknowledges the reality that universities have significant investments in current platforms and cannot simply discard them. Our integration strategy focuses on creating MCP servers that expose existing systems' capabilities through the standard protocol. This allows universities to adopt UniConnect incrementally, starting with core modules and gradually expanding functionality. From the outset, we prioritized security and privacy as fundamental requirements. All data transmission occurs over encrypted channels, and sensitive information in databases receives additional encryption. We designed comprehensive audit logging to track who accesses what information and when, providing both accountability and the ability to investigate potential security incidents.

3. Results and Discussion

3.1.Results

While UniConnect remains primarily a conceptual framework rather than a fully deployed system, analysis of its architecture demonstrates meaningful improvements over traditional university automation

International Research Journal on Advanced Engineering and Management
https://goldncloudpublications.com
https://doi.org/10.47392/IRJAEM.2026.0070
e ISSN: 2584-2854
Volume: 04 Issue: 03
March 2026
Page No: 448 - 452

approaches. The integration challenge that plagues current systems, where departments maintain separate databases with minimal coordination, finds a structured solution in the MCP-based architecture. Instead of requiring numerous custom integrations between each pair of systems, the standardized protocol enables centralized communication. A university operating ten independent systems would traditionally require up to forty-five direct integrations for complete interoperability, whereas with MCP, ten servers—one per system—are sufficient to enable communication through a common framework. This significantly reduces architectural complexity and ongoing maintenance demands. The natural language interface represents a transformative shift in user interaction. Rather than navigating multiple platforms and remembering where specific information is stored, users can pose direct questions conversationally. For instance, when a student asks whether they are on track to graduate, the system retrieves academic records, compares them against degree requirements, and provides a consolidated response identifying any outstanding obligations. This integration dramatically reduces response time and simplifies decision-making. Additionally, automation of routine administrative processes such as form handling, report generation, and workflow tracking increases institutional efficiency. Automated grading of objective assessments provides immediate feedback, while structured language analysis supports preliminary evaluation of written assignments, thereby accelerating learning cycles. Furthermore, proactive analysis of engagement patterns enables early identification of at-risk students, creating opportunities for timely intervention that may improve retention outcomes. The framework's ability to integrate gradually with existing systems also enhances its practical feasibility, allowing institutions to modernize without abandoning prior technological investments.

3.2.Discussion

The Discussion should be an interpretation of the results rather than a repetition of the Results.

The Discussion should be an interpretation of the results rather than a repetition of the Results. The Discussion should be an interpretation of the results rather than a repetition of the Results. Despite these promising outcomes, the implementation of UniConnect presents several significant challenges. The technical complexity of building and maintaining MCP servers across diverse university systems should not be underestimated. Although the protocol standardizes communication, underlying systems differ in authentication methods, data structures, and operational constraints, requiring specialized expertise for effective integration. Moreover, while Large Language Models excel at understanding natural language and generating coherent responses, they may occasionally produce confident but inaccurate outputs. Even with Retrieval-Augmented Generation grounding responses in verified institutional data, continuous monitoring and validation mechanisms remain essential to ensure reliability. Data privacy and governance also raise critical concerns. Providing AI systems with broad access to student information demands strict access controls, encryption standards, and compliance with regulatory frameworks to prevent misuse or unintended data exposure. Equally important is preserving the human element within higher education. Automation should reduce administrative burden and enhance accessibility, but it cannot replace the judgment, empathy, and contextual understanding offered by faculty and advisors. Successful adoption will therefore depend not only on technical capability but also on institutional readiness, policy development, and cultural acceptance. Ultimately, UniConnect illustrates how artificial intelligence can support university operations while reinforcing, rather than diminishing, the human relationships at the core of education.

Conclusion

Our exploration of UniConnect demonstrates that combining Large Language Models with the Model Context Protocol can address many longstanding challenges in university management. The fragmentation that has characterized university systems for decades doesn't have to be permanent. By providing a conversational interface that connects

International Research Journal on Advanced Engineering and Management
https://goldncloudpublications.com
https://doi.org/10.47392/IRJAEM.2026.0070
e ISSN: 2584-2854
Volume: 04 Issue: 03
March 2026
Page No: 448 - 452

disparate systems through standardized protocols, we can make university administration more accessible and efficient for everyone involved. The conceptual framework we've presented shows how this integration might work in practice. Students would spend less time navigating complex interfaces and more time focusing on their education. Faculty members could access the information they need without becoming experts in multiple systems. Administrative staff could complete routine tasks more quickly, freeing time for work that requires human judgment and creativity. However, technology alone cannot solve all the challenges universities face. Successful implementation requires careful attention to data security, user privacy, and the limitations of current AI systems. Universities must maintain realistic expectations about what automation can achieve while preserving the human connections that make education meaningful. The most sophisticated AI assistant cannot replace a caring advisor who helps a struggling student find their path, or an inspiring teacher who sparks intellectual curiosity. The early implementations of MCP in educational settings provide encouraging evidence that this approach is feasible. When Sakarya University created an MCP server for their student information system, they demonstrated that connecting AI assistants to academic records through standardized protocols works in real world conditions. Other institutions experimenting with LLM powered educational tools have shown that students respond positively to conversational interfaces when they work reliably. Looking forward, the integration of AI into university management represents an opportunity to build systems that serve people rather than requiring people to adapt to rigid technological constraints. As these technologies mature, the focus should remain on creating tools that enhance rather than replace human decision-making and interaction. The goal is not to automate away the human elements of education, but to free humans from routine tasks so they can focus on what they do best teaching, learning, mentoring, and discovering. The path toward smarter university systems is not about adopting the latest technology for its own sake. It's about thoughtfully applying innovations to solve real problems while maintaining the values and relationships that define higher education. UniConnect provides one possible blueprint for this transformation, demonstrating how standardized protocols and natural language interfaces can make university systems more integrated, intelligent, and humane.

Acknowledgements

We extend our gratitude to the Department of Artificial Intelligence and Data Science at Dr. D. Y. Patil Institute of Engineering, Management and Research for providing the resources and institutional support that made this research possible. Our sincere thanks go to the students, faculty members, and administrative staff who shared their experiences with current university systems and helped us understand the real-world challenges that need addressing. We also acknowledge the broader research community whose work on Large Language Models, the Model Context Protocol, and AI in education provided the foundation for this conceptual framework.

References

The development of UniConnect is informed by recent advancements in Large Language Models and intelligent educational systems. Anthropic’s introduction of the Model Context Protocol highlights a standardized approach for connecting AI systems with external tools and databases, forming the architectural foundation for integrated communication. Research such as Dan et al.’s *EduChat* demonstrates the practical application of large-scale language model chatbots in intelligent education environments. Similarly, Chen, Zhang, and Wang explore the emerging role of LLM agents in educational settings, emphasizing automation, personalization, and adaptive learning capabilities. Industry perspectives, including Matellio’s analysis of LLM-driven adaptive learning platforms, further reinforce the transformative potential of AI in streamlining academic processes and enhancing user experiences. Together, these works provide both theoretical and practical grounding for the UniConnect framework.

Journal Reference Style

[1]. Anthropic, "Introducing the Model Context

International Research Journal on Advanced Engineering and Management
https://goldncloudpublications.com
https://doi.org/10.47392/IRJAEM.2026.0070
e ISSN: 2584-2854
Volume: 04 Issue: 03
March 2026
Page No: 448 - 452

Protocol," Anthropic News, November 2024. [Online]. Available: https:// www.anthropic. com/news/model-context-protocol

[2]. Y. Dan, X. Liu, Y. Lei, P. Luo, W. Li, J. Zhao, and Z. Liu, "EduChat: A Large-Scale Language Model-based Chatbot System for Intelligent Education," arXiv:2308.02773 [cs.CL], August 2023.

[3]. S. Chen, B. Zhang, and J. Wang, "LLM Agents for Education: Advances and Applications," arXiv preprint, February 2025.

[4]. Matellio, "LLM in Education – The Secret to Smarter and Adaptive Learning Platforms," Matellio Blog, February 2025. [Online]. Available: https:// www. matellio. com/blog/ llm-in-education