BOARD # 94: WIP: Shaping the Future of Learning: The rAIder Strategy for Applied AI-Driven Education at MSOE

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Introduction

Artificial Intelligence (AI) is no longer a subject of science fiction or a niche for specialized industries. AI permeates everyday life, impacting how people work, communicate, and solve problems locally and globally [1]. AI applications in higher education have grown significantly in recent years, as evidenced by the adoption of AI-driven instructional design tools and applications (e.g., Khan Academy's Khanmigo, ChatGPT for Education, MagicSchool), AI-enabled scientific literature search engines (e.g., Semantic Scholar, Consensus), collaborative applications (e.g., MS Teams), smart AI features in learning management systems (e.g., Canvas), and AI-based assistants (e.g., Grammarly, Canva).

The widespread infusion of generative AI (GenAI) specifically marked a new pivotal moment in AI adoption driving rapid transformation across many fields. For higher education, the new technological wave demands a reevaluation of traditional teaching and learning models to remain applicable in an AI-driven world [2]. Higher education institutions now face a monumental task of embracing AI literacy as a core competency, akin to such fundamental competencies as critical thinking and effective communication. However, integrating AI into higher education presents several challenges, including the lack of standardized guidelines for curricular integration and established governance structures, ethical and safety concerns, faculty preparedness, quality and reliability of outputs, and the potential of increasing the digital divide and inequity in education.

The Milwaukee School of Engineering (MSOE) recognized the necessity for evolution in higher educational practices and responded by introducing the rAIder Strategy in Fall 2024. This initiative aims to close the gap between current educational methodologies and future workforce requirements within a rapidly changing field by integrating applied AI throughout many areas of the academic ecosystem. As a result, all MSOE graduates, irrespective of their academic disciplines, will possess comprehensive AI literacy by the time they graduate.

Within the rAIder Strategy, applied AI includes teaching and practicing responsible use of core AI technologies across diverse academic disciplines such as computer and data science, user experience, biomedical engineering, business and more. It also involves integrating AI tools into the curriculum and pedagogy, enhancing personalized student learning through AI, and promoting AI innovation through research, industry and community engagements. Furthermore, it entails continuously evaluating the impact of applied AI on institutional outcomes and refining the path for applied AI integration.

The rAIder Strategy offers a phased AI adoption plan that balances short-term goals with long-term objectives, focusing on curriculum and pedagogy, academic productivity, interdisciplinary

learning, and ethical governance. This paper outlines the strategy and early progress at MSOE, which aims to build AI literacy across all disciplines. Early results suggest this approach can effectively integrate AI into higher education, potentially serving as a model for other institutions. By sharing best practices, MSOE supports relevance, equity, and innovation in education amid rapid technological changes.

Background

The Need for Applied AI in Higher Education

The rapid proliferation of GenAI tools has prompted calls to rethink higher education, with some seeing it as a critical moment for a paradigm shift in teaching and learning. This shift is particularly significant in writing-focused disciplines but also affects engineering, science, and other fields [3], [4], [5]. More and more frequently AI assistants are used in classrooms, and this trend is expected to grow [6], [7], [8].

The AI's capacity to execute complex tasks underscores the necessity for students to acquire skills that complement AI, leveraging its capabilities to enhance their work. Concurrently, AI's potential to automate current "nonroutine" jobs highlights the importance of AI education in preparing students for a dynamic labor market. As of early 2024, the skill most in demand in job postings was artificial intelligence (0.56%), followed by machine learning (0.5%) [9]. In this context, AI literacy is essential, equipping students to harness AI to improve efficiency and productivity in their future careers [10], [11].

Additionally, higher education must align current pedagogical practices with the changing ways of thinking, learning, and interacting resulting from people's regular use of AI in their professional and personal lives [12]. Pedagogy, curriculum design, and assessment of learning need to be reevaluated to ensure students and faculty have the necessary skills in AI literacy.

Benefits of Applied AI in Education

AI is increasingly transforming higher education by boosting efficiency, productivity, research, student engagement, and personalized learning [13], [14], [15], [16], [17], [18]. AI chatbots, for instance, enhance motivation, performance, and language skills [19]. AI also improves accessibility for students with diverse abilities [20] and creates content in multiple languages, expanding professional opportunities [6], [21]. Additionally, AI improves efficiency and support in areas like academic advising, student services, and financial aid [22].

Challenges and Ethical Considerations

With AI technologies advancing faster than institutional curriculum committees can respond, higher education faces critical challenges that require careful management and ongoing research. These include potential misuse, plagiarism, academic dishonesty, cyberbullying, online harassment, and ownership of AI-generated output. Moreover, some experts argue that AI-generated content may lack depth, intellectual insights, and artistic creativity [23], [24], [25].

Additionally, AI poses risks of compromising diversity and inclusion, perpetuating bias, producing hallucinations and data inaccuracies, undermining trust and accountability, and violating privacy and intellectual property [26], [27], [28], [29]. Hence, educators must consider both the opportunities and challenges when integrating AI in higher education [5], [30].

AI Integration Frameworks

The integration of AI into higher education requires a strategic, phased approach, emphasizing immediate actions, short-term plans, and long-term goals. Complete College America's "Do Now, Do Soon, and Work Toward" [31] framework provides a practical roadmap for higher institutions to progressively incorporate AI into their operations, teaching, and student engagement. This method ensures that institutions can begin integrating AI with existing resources, gradually expand their AI capabilities, and eventually achieve transformative changes through significant investments and strategic planning.

NVIDIA's industry brief, "The Roadmap to Becoming an AI University" [32], delineates a comprehensive framework for integrating AI within academic institutions. It advises universities to embed AI into their curricula across diverse disciplines, extending beyond the traditional STEM fields, thereby preparing students for an AI-centric future. It further emphasizes the importance of investing in advanced computing infrastructure, such as high-performance computing clusters and AI laboratories, to support cutting-edge research and attract top-tier talent. The brief also underscores the necessity of establishing partnerships with industry and securing funding to foster innovation and sustain competitiveness. Furthermore, it highlights the significance of interdisciplinary research, encouraging collaboration among experts from various fields, and recruiting AI-ready talent.

rAIder Strategy

Drawing from Complete College America's 2023 methodology [31], the rAIder strategy is a comprehensive three-year plan organized into three phases: immediate actions (Do Now), short-term goals (Do Soon), and long-term objectives (Work Toward). Informed by NVIDIA's "Roadmap to Becoming an AI University" [32] and benchmark studies of AI adoption at over thirty universities, the rAIder strategy details specific actions for integrating AI into the curriculum and pedagogy, establishing faculty development, fostering research and industry collaborations, and engaging the community. It focuses on five key areas (Figure 1):

- **Curriculum and Pedagogy**: Ensure every student, regardless of major, acquires foundational AI literacy, including basic AI concepts, tools, and ethical frameworks.
- **Faculty Development**: Provide opportunities for faculty to gain the necessary skills, confidence, and pedagogical approaches to embed AI into their courses and scholarly pursuits.
- **Governance and Ethics**: Establish robust oversight mechanisms, policies, and curricula that emphasize responsible AI use, ensuring academic integrity and equitable outcomes.

- **Industry and Community Engagement**: Foster partnerships with industry leaders and community organizations to align curricula with evolving professional standards and expose students to cutting-edge AI applications.
- **Research and Innovation**: Encourage and support faculty and students to undertake AI-focused research projects, explore interdisciplinary applications, and push the boundaries of AI both within and beyond the classroom.

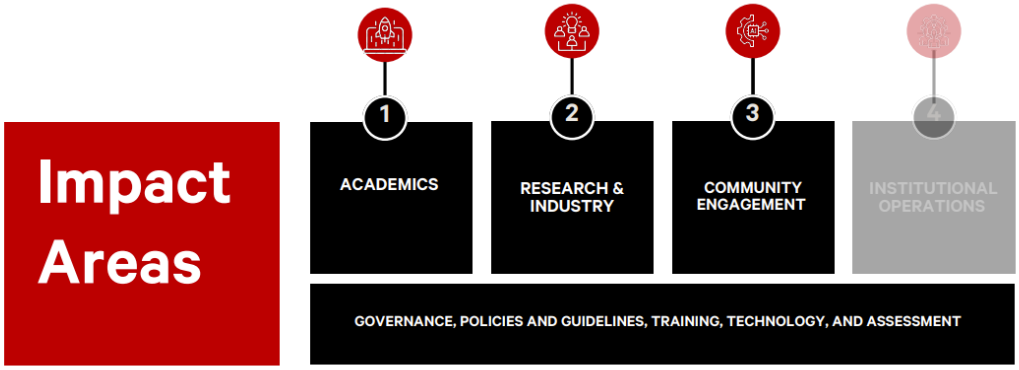

Figure 1: rAIder Strategy Impact Areas. The strategy addresses Academics, Research & Industry, and Community Engagement areas. Institutional Operations are outside the scope of the rAIder strategy.

"Do Now" – Planning and Initial Deployment Phase

The "Do Now" phase of the rAIder strategy focuses on establishing a strong foundation for AI integration at MSOE. It includes hiring a Director of Applied AI Education, forming a governance structure, which includes an AI steering committee and working groups, and aligning the roadmap with MSOE's strategic plan. Efforts involve workshops and surveys to build awareness and assess AI knowledge among faculty, staff, and students, along with updates to policies to reinforce ethical AI practices. Piloting AI modules in courses and identifying opportunities for curriculum integration are key components. This phase also includes a strategic re-evaluation of academic curricula to identify areas where AI can be integrated into and across diverse disciplines, ensuring that degree programs align with evolving industry and societal needs. Additionally, it involves evaluating technology and IT infrastructure to identify gaps and ensure support for AI initiatives, with plans for a prototype "rAIder Hub" to centralize resources, training, policies, and more. The phase emphasizes community engagement through professional education programs, workshops, and AI-related events.

"Do Soon" – Integration and Expansion Phase

The "Do Soon" phase builds on the foundation established in the initial phase, focusing on expanding and embedding AI initiatives across MSOE. This phase involves expanding AI training programs to ensure flexibility and responsiveness to recent advancements while continuously evaluating training needs based on feedback from the MSOE community, university alumni, and partners. AI working groups will use the Technology Acceptance Model

(TAM) [33] and Motivational Model (MM) [34] to study attitudes and behaviors toward AI adoption at MSOE. These frameworks will inform outreach and communication strategies, as well as other resources aimed at promoting the integration of AI. It also involves integrating AI more deeply into academic curricula by launching new AI-focused courses, developing interdisciplinary AI electives and programs, and exploring the use of AI for personalized academic support. Key infrastructure upgrades are addressed by regularly assessing and enhancing technology and IT resources to meet growing demands, while the rAIder Hub transitions from prototype to full functionality, serving as a central repository for resources, policies, and initiatives. Strategic engagement with industry and research partners becomes more robust, with mechanisms established to continuously support faculty, staff, and students in external AI-related projects. Community outreach expands through an annual "AI in Higher Education" conference, professional education offerings, and expanded series of events like hackathons and workshops. The phase also emphasizes the development of metrics to assess the impact of AI initiatives on student success, academic productivity, and institutional outcomes, ensuring continuous improvement and alignment with strategic goals.

"Work Toward" – Advancement and Continuous Improvement Phase

The "Work Toward" phase of the rAIder Roadmap focuses on advancing and continuously improving AI integration at MSOE. Key actions include actively integrating AI across all curricula, expanding interdisciplinary AI programs, and regularly updating AI literacy courses. This phase also involves expanding the hiring practice of AI-ready faculty across disciplines, enhancing personalized student support, and establishing MSOE as a Center for Applied AI Educational Research and an Applied AI Innovation Center. Additionally, it highlights the significance of a regional consortium for AI in higher education, extending AI advantages to the community, and utilizing AI to assess and predict future institutional trends, ensuring continuous improvement and strategic planning.

Figure 2 provides an overview of the rAIder strategy across three phases and depicts the three-year implementation timeline.

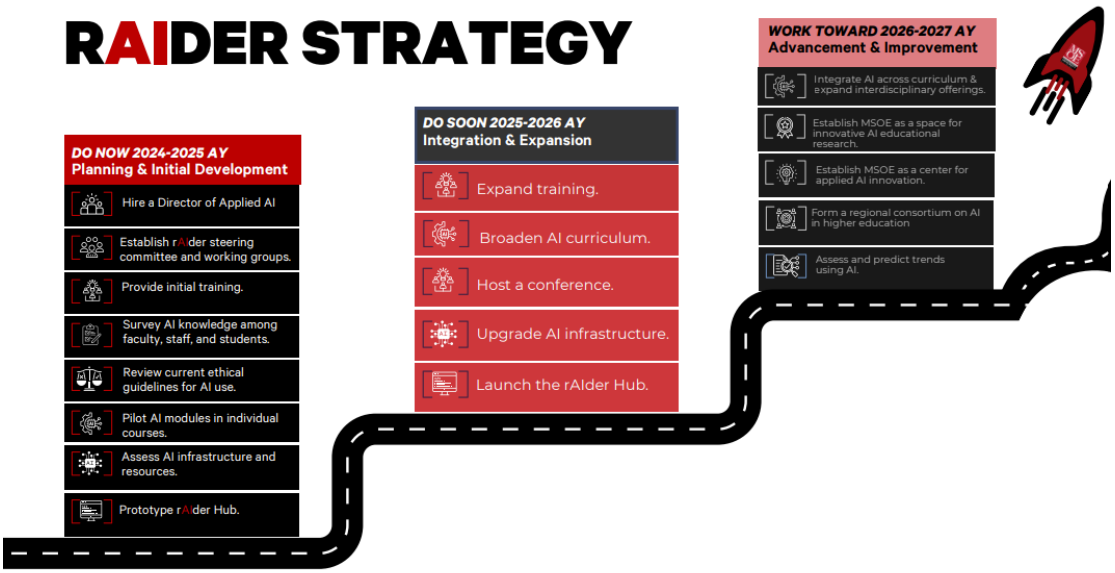

Figure 2: Overview of the rAIder Strategy. The key milestones for each phase are presented, along with the proposed timeline for implementation.

Preliminary Progress

MSOE has been proactively implementing the rAIder strategy and is well-positioned for success, given its comprehensive portfolio of AI-focused academic and professional programs, as well as its substantial involvement in AI-centered research and industry advancements. It offers an undergraduate computer science program with a specific focus on AI and a Master of Science program in Machine Learning. Additionally, MSOE provides various degree and non-degree programs that incorporate AI into diverse fields such as business, user experience, biomedical engineering, and more, along with AI-focused professional education programs, minors and certificates. Supported by the GPU-based High-Performance Supercomputing infrastructure known as "ROSIE," these programs and various research and industry AI initiatives establish a solid foundation for the advancements anticipated in the new rAIder strategy.

Building on this foundation, initial progress has been made in implementing the rAIder strategy:

- **Director of Applied AI Education:** A full-rank faculty member has been appointed to facilitate the strategy implementation at MSOE.
- **The AI Steering Committee** has been assembled and includes representatives from all academic departments, IT, Student Success, and the Teaching and Learning (CREATE) Institute to provide governance and oversight for the strategy. The committee is currently tasked with conducting a campus-wide inventory of all AI offerings across degree and non-degree programs and individual courses, as well as surveying AI knowledge across campus. Additionally, the committee ensures that the rAIder strategy aligns with the university's strategic plan. As the strategy progresses, the committee's responsibilities continue to evolve to address emerging needs and opportunities.

- **Applied AI Literacy and Training Working Group** raises awareness about AI in education, collects data on AI literacy among faculty and students, and establishes measurable goals and makes recommendations for professional development and curriculum integration. Its focus and objectives adapt as the strategy advances to incorporate new findings and address shifting priorities.
- **The Applied AI Community of Practice** involves faculty early adopters who actively investigate the potential of AI to enhance productivity, curriculum design, and pedagogy. Their evaluations of tools such as Microsoft 365 Copilot, as well as experiments with task-specific copilots and Copilot agents within courses, provide valuable insights for broader institutional adoption. The group's activities continuously adapt to reflect ongoing advancements in AI tools and educational practices.

These efforts establish an initial foundation for MSOE's rAIder strategy. The rAIder strategy is actively being implemented, and further developments will continue to advance its integration across the university.

Conclusion

The rAIder strategy aims to integrate applied AI into higher education by focusing on curricular integration, faculty development, governance, ethics, industry and community engagement, and research opportunities. MSOE is establishing a foundation for long-term AI literacy for all its graduates regardless of discipline. Although still in its early stages, initial results indicate that this strategy can help incorporate AI effectively into higher education and may serve as a model for comprehensive AI adaptation for other academic institutions. By sharing effective practices, MSOE aims to support efforts to maintain relevance, equity, and innovation in higher education during periods of rapid technological change.