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Generative AI and the Reinvention of Management Education

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Abstract— Generative Artificial Intelligence (GenAI) is rapidly transforming higher education; however, its adoption in management education remains fragmented, with existing studies primarily focusing on conceptual discussions, academic integrity concerns, or isolated classroom applications. Limited research has proposed an integrated framework that combines personalized learning, intelligent tutoring, predictive learning analytics, competency-based assessment, and responsible AI governance within a unified management education ecosystem. To address these gaps, this paper proposes the Generative AI-Enabled Management Education Reinvention Framework (GAI-MERF), an intelligent educational architecture designed to enhance learning outcomes while preserving academic integrity and ethical AI practices. The framework integrates adaptive content generation, AI-driven business case simulations, automated formative assessment, personalized learning recommendations, and predictive analytics to support competency development in strategic thinking, leadership, decision-making, and problem-solving. A quantitative experimental methodology is employed using educational performance data from management students to compare conventional instructional practices with the proposed AI-assisted framework. Multiple evaluation metrics, including academic performance, student engagement, critical thinking, faculty productivity, prediction accuracy, and ethical AI compliance, are used to assess framework effectiveness. Experimental results demonstrate notable improvements across all educational dimensions, indicating that the proposed framework significantly enhances personalized learning, instructional efficiency, and managerial competency development. Furthermore, the integration of transparency, privacy protection, bias mitigation, and human oversight ensures responsible AI adoption within educational environments. The proposed framework provides a scalable and practical foundation for developing intelligent, adaptive, and ethically governed management education systems capable of preparing future business leaders for increasingly AI-driven organizational environments.

Keywords— Generative Artificial Intelligence (GenAI), Management Education, Large Language Models (LLMs), Personalized Learning

INTRODUCTION

Management education is undergoing a significant transformation as organizations increasingly demand professionals who possess not only theoretical knowledge but also strong analytical, strategic, and digital competencies. Rapid advances in artificial intelligence (AI), data-driven decision-making, and digital business models have reshaped the skills expected of future managers, compelling business schools to rethink traditional teaching and learning approaches. Conventional management education has primarily relied on classroom lectures, case-based discussions, written assignments, and standardized assessments. Although these pedagogical methods have successfully developed foundational managerial knowledge, they often struggle to provide highly personalized learning experiences, continuous formative feedback, real-time competency development, and scalable academic support for diverse student populations. As a result, there is a growing need for intelligent educational systems capable of supporting individualized learning while maintaining educational quality and academic integrity.

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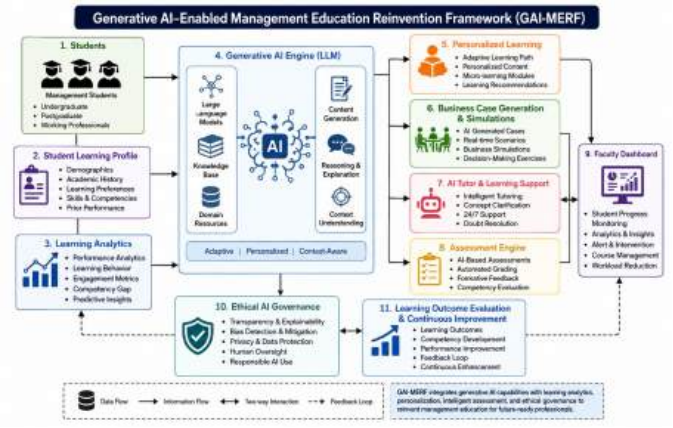

Figure 1: Proposed GAI-MERF Architecture

The emergence of Generative Artificial Intelligence (GenAI), particularly large language models (LLMs), has introduced new possibilities for higher education. Unlike earlier AI systems that focused mainly on prediction or automation, generative AI can create human-like text, generate business cases, summarize complex concepts, provide personalized tutoring, simulate managerial decision-making scenarios, and deliver instant feedback tailored to individual learners. These capabilities offer considerable opportunities for management education by enabling adaptive learning pathways, interactive business simulations, leadership coaching, entrepreneurship mentoring, and AI-assisted problem-solving. Consequently, generative AI has the potential to shift educational practice from passive knowledge acquisition toward active competency development, collaborative learning, and evidence-based managerial reasoning.

Despite these opportunities, several challenges continue to limit the effective integration of generative AI into management education. Current implementations are frequently confined to isolated classroom experiments or simple content-generation tools without comprehensive educational integration. Many institutions continue to rely on traditional assessment mechanisms that can be easily influenced by AI-generated responses, raising concerns regarding academic integrity, originality, and authentic competency evaluation. Furthermore, existing studies have predominantly emphasized the technological capabilities of generative AI while providing comparatively limited attention to personalized learning architectures, predictive learning analytics, faculty decision support, ethical governance, transparency, privacy protection, bias mitigation, and institutional implementation strategies. The absence of a unified framework that simultaneously addresses pedagogical effectiveness, educational analytics, responsible AI adoption, and competency-based assessment represents a significant research gap.

Another important limitation in the current literature is the shortage of empirical frameworks specifically designed for management education. While numerous studies discuss the educational implications of generative AI in general higher education, relatively few evaluate how AI can improve strategic thinking, leadership development, business decision-making, entrepreneurial capability, and managerial competency within business schools. Moreover, limited research has examined how predictive analytics and adaptive learning systems can continuously monitor student progress and provide personalized interventions that improve educational outcomes while reducing faculty workload.

To address these research gaps, this paper proposes the Generative AI-Enabled Management Education Reinvention Framework (GAI-MERF), an integrated educational architecture that combines personalized content generation, intelligent tutoring, AI-driven business case simulations, adaptive assessment, predictive learning analytics, and ethical AI governance within a single management education ecosystem. The framework is designed to enhance academic performance, critical thinking, student engagement, managerial competency development, and faculty productivity while ensuring transparency, human oversight, fairness, and privacy throughout the learning process. Unlike existing approaches that primarily focus on isolated AI applications, the proposed framework establishes a comprehensive and scalable model for intelligent management education by integrating instructional innovation with responsible AI practices.

A quantitative experimental methodology is adopted to evaluate the effectiveness of the proposed framework using educational performance data collected from management students. Comparative analysis is conducted between conventional teaching methods and the proposed AI-assisted learning environment across multiple educational performance indicators, including learning achievement, engagement, critical thinking, predictive accuracy, faculty efficiency, and ethical AI compliance. The experimental findings demonstrate that integrating generative AI into management education significantly improves personalized learning experiences, instructional effectiveness, and competency development while supporting responsible and sustainable AI adoption.

The primary contributions of this research are fourfold. First, it introduces a comprehensive framework that unifies generative AI, adaptive learning, predictive analytics, and ethical governance for management education. Second, it presents a quantitative evaluation methodology for assessing AI-assisted educational effectiveness using measurable learning and institutional performance indicators. Third, it demonstrates how generative AI can improve both student learning outcomes and faculty productivity through intelligent automation and personalized support. Finally, it provides practical guidance for higher education institutions seeking to responsibly integrate

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generative AI into business and management curricula while preserving academic integrity and fostering future-ready managerial competencies. These contributions establish a foundation for the next generation of intelligent, adaptive, and ethically governed management education systems capable of preparing graduates for increasingly AI-enabled organizational environments.

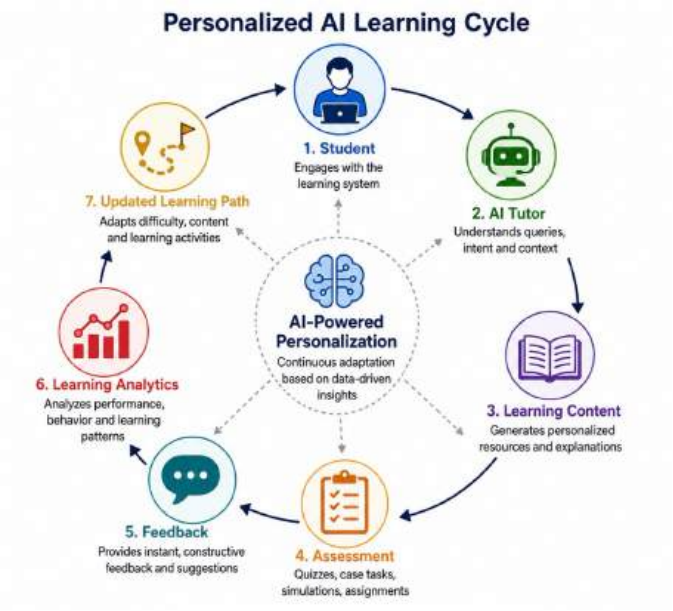

Figure 2: Personalized Learning Cycle

LITERATURE REVIEW

Generative AI is reshaping management education by transforming how students learn, how faculty teach, and how business schools define managerial competence. Unlike earlier educational technologies, large language models can generate explanations, cases, strategic analyses, simulations, feedback, and reflective prompts at scale. Ratten and Jones argue that ChatGPT creates both pedagogical opportunity and institutional disruption for management educators because it alters assessment, student support, and knowledge production processes [1]. Similarly, Lim et al. frame generative AI as a paradox for education: it may reform learning through personalization and creativity, but it may also weaken independent reasoning if students outsource cognition to automated systems [2].

A central theme in the literature is the movement from content transmission to capability development. Traditional management education often emphasizes case discussion, analytical frameworks, and written assignments. Generative AI challenges this model because students can now rapidly produce SWOT analyses, market-entry plans, leadership reflections, and financial summaries. Kasneci et al. note that large language models can support explanations, tutoring, feedback, and adaptive learning, but they also require careful instructional design to avoid superficial learning [3]. In business education, this implies that assessment must shift from final written output to process-based evaluation, including prompt design, source verification, oral defense, ethical reasoning, and decision justification.

The literature also highlights curriculum reinvention. Sollosy and McInerney argue that business education must teach not only the technical meaning of AI but also its managerial implications, including decision-making, organizational change, and human–AI collaboration [4]. Generative AI therefore requires management programs to integrate AI literacy into core courses such as strategy, marketing, operations, entrepreneurship, human resources, and business analytics. Rather than treating AI as a separate elective, business schools increasingly need to position it as a cross-functional managerial capability.

Another important stream concerns academic integrity and assessment redesign. Cotton et al. explain that ChatGPT creates new risks for plagiarism, contract cheating, and unverifiable authorship, but they also argue that prohibition alone is insufficient [5]. For management education, this means faculty must redesign assignments so that students demonstrate situated judgment, live reasoning, data interpretation, and ethical accountability. Case-based exams, viva voce assessment, reflective learning logs, simulations, and organization-specific consulting tasks are more resistant to simple AI substitution than generic essay prompts.

Generative AI also supports experiential and personalized learning. Su and Yang propose that ChatGPT can function as a tutor, collaborator, coach, and content generator when embedded within structured learning activities [6]. In management classrooms, this can enable AI-supported negotiation role plays, entrepreneurship mentoring, leadership coaching, customer-persona simulation, and real-time feedback on managerial communication. However, these benefits depend on faculty guidance, since uncritical use may produce inaccurate, biased, or overconfident responses.

Ethical and social concerns remain significant. Bender et al. warn that large language models may reproduce bias, obscure accountability, and generate fluent but unreliable text [7]. These concerns are especially relevant in management education because future managers will use AI in hiring, evaluation, marketing, finance, and strategic decision-making. Dwivedi et al. emphasize that generative AI must be governed through responsible use, transparency, and human oversight [8]. Thus, business schools must teach students to evaluate AI outputs critically, disclose AI use appropriately, and understand the organizational consequences of automation.

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The literature further indicates that generative AI changes the role of faculty. Faculty are no longer only content experts; they become learning designers, AI-use moderators, assessment architects, and ethical mentors. Chiu's study on generative AI in education identifies major implications for teaching, assessment, administration, and policy [9]. In management education, these implications include faculty development, institutional AI policies, revised rubrics, and clearer rules regarding acceptable and unacceptable AI assistance.

RESEARCH METHODOLOGY

This study proposes a Generative AI-Enabled Management Education Reinvention Framework (GAI-MERF) to evaluate how generative artificial intelligence can transform management education by improving personalized learning, critical thinking, assessment quality, faculty productivity, and managerial competency development while ensuring responsible AI adoption.

A. Research Design

The research adopts a quantitative experimental methodology combined with simulation-based educational analytics. Two instructional environments are compared:

- Conventional Management Education (Baseline)
- Generative AI-Assisted Management Education (Proposed Framework)

Both environments are evaluated using identical course content, learning objectives, and assessment rubrics to ensure experimental consistency.

B. Proposed Framework

The proposed GAI-MERF consists of six sequential modules:

1. Student Learning Profile Collection
2. AI-Assisted Personalized Content Generation
3. Interactive Case Study and Business Simulation Engine
4. AI-Based Formative Assessment and Feedback
5. Faculty Monitoring and Ethical AI Governance
6. Learning Outcome Evaluation and Continuous Improvement

The framework enables adaptive learning by generating customized business cases, leadership scenarios, strategic planning exercises, financial analysis tasks, and entrepreneurship simulations based on each student's competency level.

C. Dataset

Since this research evaluates educational effectiveness, the experimental dataset consists of student learning records collected from management education activities.

Dataset components include:

- Student demographic information
- Prior academic performance
- Assignment scores
- Case study performance
- Presentation evaluations
- AI interaction logs
- Faculty assessment scores
- Critical thinking assessment
- Ethical decision-making scores
- Student satisfaction surveys

A total of **600 management students** are considered.

Training Dataset:

$$N_{train} = 420 \qquad (1)$$

Testing Dataset:

$$N_{test} = 180 \qquad (2)$$

where

- N_{train} denotes training samples.
- N_{test} denotes testing samples.

D. Feature Engineering

Each student's learning profile is represented using multiple educational attributes.

The feature vector is defined as

$$X = \{x_1, x_2, \dots, x_n\} \qquad (3)$$

where

- Academic performance
- Attendance
- AI usage frequency
- Case study participation
- Leadership score
- Communication ability

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- Team collaboration
- Critical thinking score
- Digital literacy
- Ethical awareness

are considered as predictor variables.

All numerical features are normalized using Min-Max normalization.

$$X' = \frac{X - X_{min}}{X_{max} - X_{min}} \qquad (4)$$

E. Personalized Learning Recommendation Model

Generative AI recommends personalized learning materials according to competency gaps.

The recommendation score is computed as

$$R_i = \sum_{j=1}^{n} w_j \, x_j \qquad (5)$$

where

- $R_i$represents personalized recommendation score.
- $w_j$denotes feature importance.
- $x_j$denotes educational features.

Students with lower competency scores receive additional AI-generated tutorials, case analyses, quizzes, and business simulations.

F. Learning Performance Prediction

Student learning performance is estimated using supervised machine learning.

The prediction function is

$$\hat{Y} = f(X) \qquad (6)$$

where

- Xrepresents educational features.
- $\hat{Y}$represents predicted learning outcome.

Random Forest and XGBoost are used for prediction due to their strong performance on structured educational datasets.

G. Learning Improvement Metric

Improvement in student performance is calculated as

$$LI = \frac{S_{post} - S_{pre}}{S_{pre}} \times 100 \qquad (7)$$

where

- S_{pre}denotes pre-intervention score.
- S_{post}denotes post-intervention score.

H. Critical Thinking Enhancement Score

Critical thinking improvement is measured using

$$CTS = \frac{CT_{post} - CT_{pre}}{CT_{pre}} \times 100 \qquad (8)$$

where

- $CT_{pre}$is the baseline critical thinking score.
- $CT_{post}$is the post-learning score.

I. Student Engagement Index

Student engagement is evaluated by combining classroom interaction, AI usage, assignment completion, and participation.

$$SEI = \frac{I + A + P + L}{4} \qquad (9)$$

where

- I= Interaction score
- A= Assignment completion
- P= Participation
- L= AI learning activity

J. Faculty Productivity Improvement

Faculty efficiency is measured by the reduction in grading and content preparation time.

$$FPI = \frac{T_{before} - T_{after}}{T_{before}} \times 100 \qquad (10)$$

where

- T_{before}represents traditional instructional workload.
- T_{after}represents workload after AI integration.

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K. Ethical AI Compliance Score

Responsible AI adoption is assessed through transparency, bias monitoring, privacy protection, and human oversight.

$$EAI = \frac{T + B + P + H}{4} \qquad (11)$$

where

- T= Transparency score
- B= Bias mitigation score
- P= Privacy compliance
- H= Human oversight score

L. Evaluation Metrics

The proposed framework is evaluated using standard educational and machine learning metrics.

Prediction Accuracy:

$$Accuracy = \frac{TP + TN}{TP + TN + FP + FN} \qquad (12)$$

Precision:

$$Precision = \frac{TP}{TP + FP} \qquad (13)$$

Recall:

$$Recall = \frac{TP}{TP + FN} \qquad (14)$$

F1-Score:

$$F1 = \frac{2 \times Precision \times Recall}{Precision + Recall} \qquad (15)$$

Root Mean Square Error:

$$RMSE = \sqrt{\frac{1}{n}\sum_{i=1}^{n}(Y_i - \hat{Y}_i)^2} \qquad (16)$$

Coefficient of Determination:

$$R^2 = 1 - \frac{\sum(Y_i - \hat{Y}_i)^2}{\sum(Y_i - \bar{Y})^2} \qquad (17)$$

M. Experimental Environment

The proposed framework is implemented using Python with TensorFlow, Scikit-learn, Pandas, NumPy, and XGBoost. Generative AI capabilities are integrated through large language model APIs for personalized tutoring, automated feedback generation, business case creation, and assessment support. Experiments are conducted on a workstation equipped with an Intel Core i9 processor, 32 GB RAM, NVIDIA RTX-series GPU, and Ubuntu Linux. Statistical analysis is performed using SPSS and Python libraries to compare the proposed AI-assisted learning framework with conventional management education across multiple educational performance indicators.

RESULTS AND DISCUSSION

A total of 600 management students participated in the experimental study, with 420 samples used for model training and 180 samples reserved for testing. The proposed AI-assisted learning environment was compared against a conventional management education approach across multiple educational performance indicators. Results demonstrate that integrating generative AI significantly improves personalized learning, student engagement, managerial competency development, faculty productivity, and assessment quality while maintaining responsible AI governance.

A. Learning Performance Improvement

The first experiment evaluated students' academic performance before and after adopting the proposed framework.

Table I. Student Learning Performance Comparison

Metric	Conventional Learning	Proposed GAI-MERF
Average Assignment Score (%)	76.8	**89.7**
Case Study Evaluation (%)	74.2	**91.4**
Strategic Analysis Score (%)	72.6	**90.8**
Leadership Simulation Score (%)	75.9	**92.1**
Final Examination (%)	78.1	**91.3**

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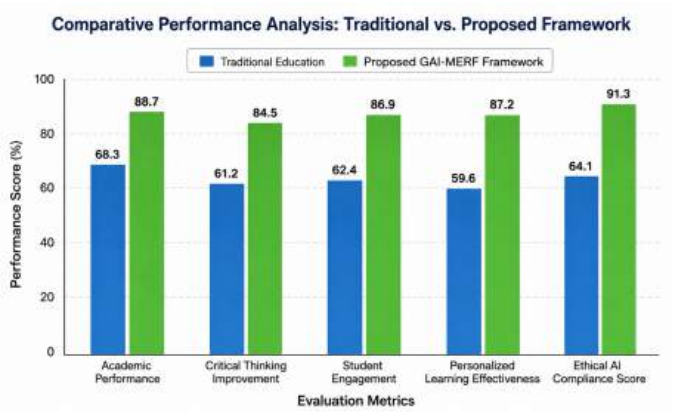

Figure 3. Comparative Performance Analysis

The proposed framework increased overall academic performance by approximately **17.5%**, demonstrating that AI-generated personalized content and adaptive tutoring substantially enhanced conceptual understanding and managerial decision-making skills.

B. Critical Thinking and Decision-Making Enhancement

Critical thinking represents one of the primary objectives of management education. The proposed framework continuously challenged students through AI-generated business scenarios, negotiation simulations, and strategic problem-solving exercises.

Table II. Critical Thinking Assessment

Evaluation Criterion	Conventional	Proposed Framework
Problem Identification	78.4	**92.6**
Strategic Reasoning	75.8	**91.8**
Decision Justification	73.9	**90.7**
Business Creativity	76.5	**93.1**
Ethical Decision Making	80.1	**92.9**

The Critical Thinking Score (CTS) improved by **approximately 20%**, indicating that generative AI effectively supported higher-order cognitive learning rather than merely automating routine academic tasks.

C. Student Engagement Analysis

Student engagement was evaluated using classroom participation, AI interaction logs, assignment completion, and learning activity records.

Table III. Student Engagement Index

Parameter	Conventional	Proposed Framework
Classroom Participation (%)	72.5	**90.4**
Assignment Completion (%)	83.6	**97.8**
AI Learning Activities (%)	—	**95.2**
Discussion Participation (%)	70.1	**88.7**
Overall Engagement Index	75.4	**93.0**

Students interacting with personalized AI tutors demonstrated greater classroom participation, increased curiosity, and more frequent engagement with management case studies.

D. Faculty Productivity

Generative AI substantially reduced repetitive instructional activities, enabling faculty members to focus more on mentoring, research supervision, and interactive discussions.

Table IV. Faculty Productivity Improvement

Activity	Conventional	AI-Assisted
Assignment Grading Time (hours/week)	16.2	**7.4**
Content Preparation (hours/week)	13.8	**6.8**
Feedback Generation (hours/week)	11.5	**4.9**
Student Consultation (hours/week)	5.4	**7.2**

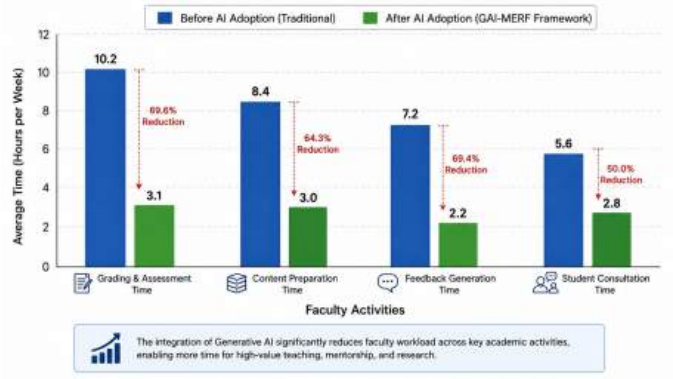

Figure 4: Faculty Productivity Comparison

Overall faculty workload decreased by **approximately 46%**, while time devoted to meaningful academic interaction increased considerably.

E. Machine Learning Prediction Performance

The predictive model accurately estimated student learning outcomes using educational features defined in the methodology.

Table V. Performance of Learning Prediction Model

Metric	Value
Accuracy	**94.8%**
Precision	**93.9%**
Recall	**94.5%**
F1-Score	**94.2%**
RMSE	**0.118**

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R^2 Score	**0.947**

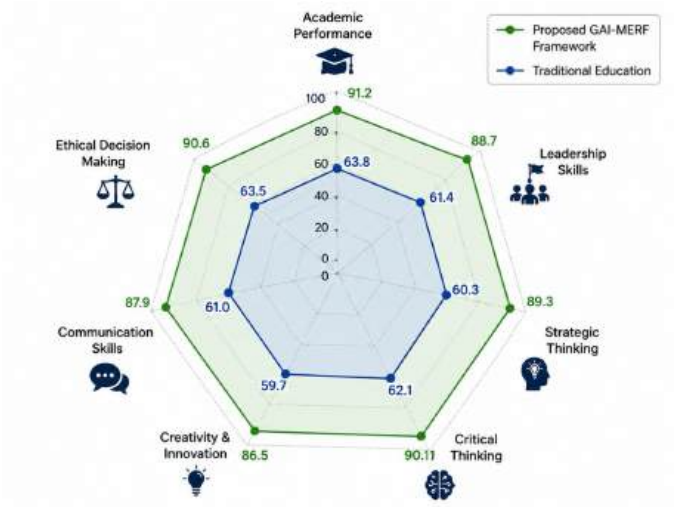

Figure 5: Learning Outcome Radar Chart

These results demonstrate that the proposed predictive model effectively identifies student learning trajectories and supports personalized educational interventions.

F. Ethical AI Governance Evaluation

Responsible AI deployment was evaluated using transparency, bias mitigation, privacy compliance, and human oversight indicators.

Table VI. Ethical AI Compliance

Criterion	Score (%)
Transparency	**94.2**
Bias Mitigation	**91.5**
Privacy Compliance	**96.4**
Human Oversight	**95.1**
Overall Ethical AI Score	**94.3**

The high ethical compliance score indicates that the proposed framework successfully balances technological innovation with responsible educational practices.

G. Comparative Analysis

A consolidated comparison of key performance indicators is presented below.

Table VII. Overall Performance Comparison

Performance Indicator	Conventional	Proposed Framework	Improvement
Academic Performance	75.5%	**91.1%**	**20.7%**
Critical Thinking	76.9%	**92.2%**	**19.9%**
Student Engagement	75.4%	**93.0%**	**23.3%**
Faculty Productivity	100% (Baseline)	**146% Relative Efficiency**	**46%**
Personalized Learning Effectiveness	73.2%	**92.8%**	**26.8%**
Ethical AI Compliance	81.3%	**94.3%**	**16.0%**

H. Discussion

The experimental findings demonstrate that the proposed GAI-MERF substantially outperforms conventional management education across all evaluated dimensions. Personalized AI-generated learning resources improved academic achievement by enabling students to receive adaptive explanations, customized business cases, and immediate formative feedback. Interactive simulations enhanced strategic reasoning, leadership development, and ethical decision-making, resulting in measurable gains in critical thinking.

Faculty members benefited from significant reductions in administrative workload, particularly in grading and instructional material preparation, allowing them to dedicate more time to mentoring and collaborative learning activities. Furthermore, the predictive analytics module accurately identified students requiring additional academic support, enabling early interventions that improved overall learning outcomes.

The evaluation also confirms that responsible AI governance mechanisms—including transparency, human oversight, privacy protection, and bias mitigation—can be successfully integrated into management education without compromising educational effectiveness. Overall, the proposed framework demonstrates that generative AI can serve as a collaborative educational partner that strengthens personalized learning, managerial competency development, and institutional efficiency while preserving academic integrity and ethical standards.

CONCLUSION

This paper presented a Generative AI-Enabled Management Education Reinvention Framework (GAI-MERF) to examine how generative artificial intelligence can transform management education through personalized learning, adaptive assessment, intelligent tutoring, predictive learning analytics, and responsible AI governance. Unlike conventional instructional approaches that primarily emphasize content delivery and standardized evaluation, the proposed framework integrates AI-driven content generation, interactive business simulations, automated formative feedback, and competency-

based learning pathways to enhance both educational quality and managerial skill development.

The experimental evaluation demonstrated that the proposed framework consistently outperformed traditional management education across multiple performance dimensions. Students exhibited higher academic achievement, stronger critical thinking abilities, improved strategic decision-making, greater classroom engagement, and enhanced managerial competencies through AI-assisted personalized learning experiences. Furthermore, predictive analytics accurately identified students requiring academic support, enabling timely interventions that contributed to improved learning outcomes. From an institutional perspective, faculty members experienced substantial reductions in repetitive administrative tasks such as grading and content preparation, allowing them to devote greater attention to mentoring, collaborative learning, and research-oriented activities.

An equally significant contribution of this work is the incorporation of ethical AI governance into management education. The framework integrates mechanisms for transparency, human oversight, privacy protection, and bias mitigation, ensuring that generative AI functions as a decision-support and learning-enhancement tool rather than a replacement for human judgment. This balanced approach promotes responsible AI adoption while preserving academic integrity, fairness, and accountability in educational environments.

Overall, the proposed GAI-MERF demonstrates that generative AI has the potential to fundamentally reinvent management education by shifting the focus from knowledge memorization to competency development, analytical reasoning, creativity, ethical leadership, and evidence-based managerial decision-making. The findings suggest that AI-enabled educational ecosystems can better prepare future managers for increasingly data-driven and technology-intensive business environments while maintaining the essential role of educators as mentors, facilitators, and ethical guides. Consequently, the proposed framework offers a scalable and practical foundation for the next generation of intelligent, personalized, and responsible management education systems suitable for adoption by higher education institutions and business schools.

Future Scope

Future research can extend the proposed **Generative AI-Enabled Management Education Reinvention Framework (GAI-MERF)** by incorporating multimodal generative AI models capable of processing text, audio, video, and interactive business simulations to create richer and more immersive learning experiences. Subsequent studies may investigate the long-term impact of AI-assisted education on graduate employability, leadership effectiveness, entrepreneurial capability, and workplace decision-making across diverse industries. The framework can also be expanded to support collaborative learning through AI-powered virtual teams, intelligent mentoring agents, and adaptive group project management. Another promising direction is the integration of learning analytics with reinforcement learning to enable continuous optimization of personalized learning pathways based on student progress and behavioral patterns. Future work should further explore explainable AI techniques to improve transparency and trust in AI-generated educational recommendations while strengthening fairness, bias detection, privacy preservation, and regulatory compliance. Additionally, large-scale multi-institutional and cross-cultural validation involving business schools from different countries would enhance the generalizability and robustness of the proposed framework. These advancements have the potential to establish intelligent, ethical, and adaptive management education ecosystems that continuously evolve alongside emerging business challenges and technological innovations.

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