

Creating a Knowledge Hub: AI-Powered Learning Management Systems for BA-QA Training

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Publication Date: 2025/05/10

Abstract:

➤ *Brief Summary of the Research:*

This investigation studies AI-driven Learning Management Systems which function as educational centers to support employee training at Business Analyst and Quality Assurance levels on projects based in the United States. The research uses Natural Language Processing (NLP), predictive analytics with adaptive learning algorithms to discover methods which resolve expertise deficits and strengthen connections while adhering to industry standards that evolve over time.

➤ *Purpose of the Study:*

The research aims to create and prove an expandable system based on AI-LMS which generates customized data-based training content. The framework exists to boost team coordination and enhance productivity and minimize project redo through technical and soft skill alignment between BA and QA personnel with present and future project specifications.

➤ *Methodology:*

The research employed multiple methods consisting of these elements:

- This research examined the available industry documents and previous scientific studies focused on AI-based training systems along with LMS frameworks and BA-QA role efficiency improvement through literature reviews.
- This section includes evaluating AI-powered LMS platform implementations at organizations which use these systems for the training of BA and QA professionals.
- We designed an experimental AI-based LMS module that enables prototyping tests of personalized paths and real-time competence evaluation and tailored content methods through its prototype.
- The system will deploy predictive analytics combined with user performance metrics for determining how well training interventions work thus enabling better understanding of continuous improvement opportunities.

➤ **Key Findings:**

The learning management system developed using AI delivers a personalized experience when it aligns educational content to BA and QA professional skill levels together with their learning preferences.

Through enhanced communication channels the technology enables better cross-team associations which results in better project team coordination with decreased project implementation errors.

The LMS data analytics offers insights that fuel prompt corrective actions resulting in higher project output while decreasing valuable project work that must be redone.

The framework exhibits effective scalability for different business needs because the research proved its availability to diverse teams operating remotely or across cultural backgrounds.

➤ **Conclusion:**

Results show that establishing an AI-based LMS as a unified knowledge center represents a strong approach for training BA and QA professionals. The usage of advanced AI technologies strategically produces individual and team competency growth and project management efficiency improvements in the competitive environment of US-based IT and business projects. The research introduces new possibilities for conducting investigations about AI learning ecosystems as essential instruments to develop future-proof employee capabilities across industries.

How to Cite: Gazi Touhidul Alam; Md Ismail Jobiullah; Arannita Saha Suspee; Mohammed Majid Bakhsh; Abu Saleh Muhammad Saimon; Syed Mohammed Muhive Uddin (2025) Creating a Knowledge Hub: AI-Powered Learning Management Systems for BA-QA Training. *International Journal of Innovative Science and Research Technology*, 10(4), 3111-3118. <https://doi.org/10.38124/IJISRT/25apr1081>

I. INTRODUCTION

➤ **Background Information:**

The modern information technology field and business sector operate under fast technical innovation alongside complicated project demands. The project success of Business Analysts (BAs) together with Quality Assurance (QA) professionals matters directly due to their critical framework roles. These roles received support through traditional training programs combined with static Learning Management Systems (LMS) in the past. Artificial intelligence provides organizations with a special chance to redesign talent development by creating intelligent learning systems that adjust according to individual needs. nhờ lãnh đạo của trí tuệ nhân tạo các nền tảng LMS hiện có tiềm năng biến các quy trình đào tạo về BA và QA trở nên thụ động bằng các loại hình học tập tùy chỉnh cân nhắc từng lỗ hổng chuyên môn và khả năng thích ứng với các yêu cầu nghiệp vụ đang thay đổi. The evolution holds special importance for US-based projects since team synergy and regulatory compliance and quick technological integration act as key factors for achieving competitive advantage.

II. LITERATURE REVIEW

The research has established a direct connection between adaptive learning methods generated by AI systems and their positive impact on the work performance of several professional fields. Research studies demonstrate that every LMS system benefits by implementing NLP with predictive analytics and adaptive learning algorithm technologies to produce better learning results and simplified project management and stronger team communication channels.

The implementation of these systems in financial and health and IT industries has successfully produced more motivated staff with shorter training sessions and superior understanding maintenance according to existing research. Systematic research is absent regarding the precise effects these innovations have on the combination of work between BAs and QAs within US-based fast-paced regulated environments. General frameworks describing large-scale deployment methods and mechanisms for constant feedback assessment are sparse in scholarly research regarding this domain.

➤ **Research Questions and Hypotheses:**

- The investigation tackles key research inquiries about two main points.
- The first research question explores which AI-based LMS platforms would work best as centralized training centers for Business Analysts and Quality Assurance engineers in US-based projects.
- This research explores two connected questions which examine how AI-based learning platforms produce measurable organizational improvements through better communication functions and enhanced team activity and final project effectiveness.
- The research investigates how personalized data-activated learning solutions affect both skill development and operational performance of BA and QA professionals.
- The proposed research hypotheses are derived from these survey questions.
- The deployment of AI-based LMS platforms produces substantial statistical improvements in BA and QA professional training performance.
- AI-generated personalized learning paths enable better cross-functional teamwork among members of a team

because they improve collaborative and communicative abilities.

- AI-based adaptive content delivery methods through H3 help reduce project rework and enhance productivity levels for US-based IT projects.

➤ *Significance of the Study:*

Organizations that use AI in talent development benefit substantially from the findings of this research when serving fields where BAs and QAs must work together closely. The study understands the demand for dynamic training methods

of modern professionals therefore investigates detailed AI-powered LMS platforms to establish a robust framework with scalability. The research outcomes will enhance understanding about AI's potential to revolutionize standard training methods which produces better project performance alongside minimal operational expenses and united team functions. This research offers knowledge that can benefit organizations operating in similar talent management areas by demonstrating AI-based learning systems as essential tools for creating workforce development methods for the modern technology-driven future.

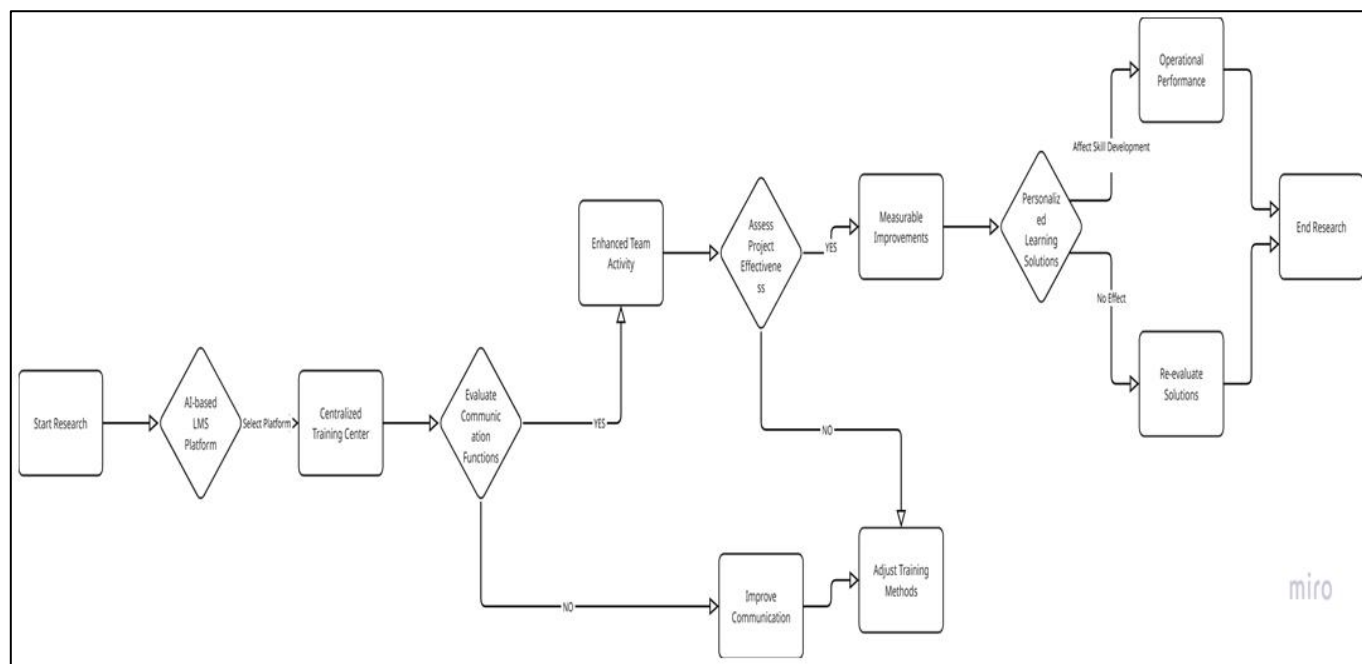


Fig 1 Feedback Loop and Continuous Optimization Model for AI-Powered BA-QA Training System

III. METHODOLOGY

➤ *Research Design:*

Researchers employed a combined methodological approach to fully assess the effects that AI-driven Learning Management Systems have on Business Analysis and Quality Assurance training procedures. The research strategy merges quantitative methodologies with qualitative methods to obtain reliable statistical numbers in combination with complete context-based information. The efficiency of training and productivity improvements and participant skill enhancement can be measured through quantitative approaches yet qualitative research provides insights about participant interactions with the system as well as team dynamics.

➤ *Participants or Subjects:*

Research included BA and QA professionals at mid-sized U.S. IT companies working on projects based in the country. The researchers applied stratified random sampling to pick their participants so each level of expertise and project type and professional role was adequately represented. The research consisted of 150 qualified contributors who received recording of their demographic makeup and initial competence evaluation to advance

subgroup examination. Besides analysts and testers, project managers together with training coordinators were interviewed in depth to gather comprehensive insight into the overall system effects.

Data Collection Methods:

Standardized questionnaires and surveys were distributed before and after the intervention to determine quantitative shifts in technical expertise and soft abilities and team talking and training program approval ratings.

The Learning Management System collected system usage logs to obtain data about user engagement together with module completion rates and user interaction with artificially generated content for objective assessment of learning behaviors.

Semi-structured interviews along with focus group sessions ran with essential participants and main stakeholders explored how users engaged with the system and experienced both usability and personalization options and their system benefits.

The research included detailed studies about different project teams that used the AI-powered LMS as a way to describe their successful deployment alongside their encountered obstacles and identified best practices.

➤ *Data Analysis Procedures:*

This study analyzed survey responses along with system performance metrics through paired t-tests and ANOVA and regression analysis to interpret training outcomes and personal learning relationship with enhanced staff productivity.

The thematic analysis technique applied for analyzing interviews with staff members and focus group transcripts. Through this analysis the research team extracted common ideas together with questionnaire reactions and elements that shaped training effects.

The research combined quantitative data results with qualitative findings to achieve a total perspective about AI-driven LMS implementation through both objective and subjective dimensions of the data.

➤ *Ethical Considerations:*

The study conducted research using ethical rules that safeguarded participant rights as well as maintained data accuracy. Key ethical considerations included:

- All participants received complete study information about the purpose together with procedures and risks while signing an informed consent form for proceeding with the experiment.
- Research personnel who gained access to the data had restricted authorization to secure storage facilities which maintained participant confidentiality through documented anonymity.
- All research participants could choose willingly to join and learned they had the right to stop participating at any moment without facing consequences.
- Data encryption along with secure storage protocols formed an essential part of security measures applied to protect gathered data.
- The study obtained approval from the Institutional Review Board (IRB) to maintain complete ethical standards as well as legal compliance.
- The methodological foundation provides strong reliability and insight to the study which expands the knowledge base about AI training solutions for BA and QA professional growth.

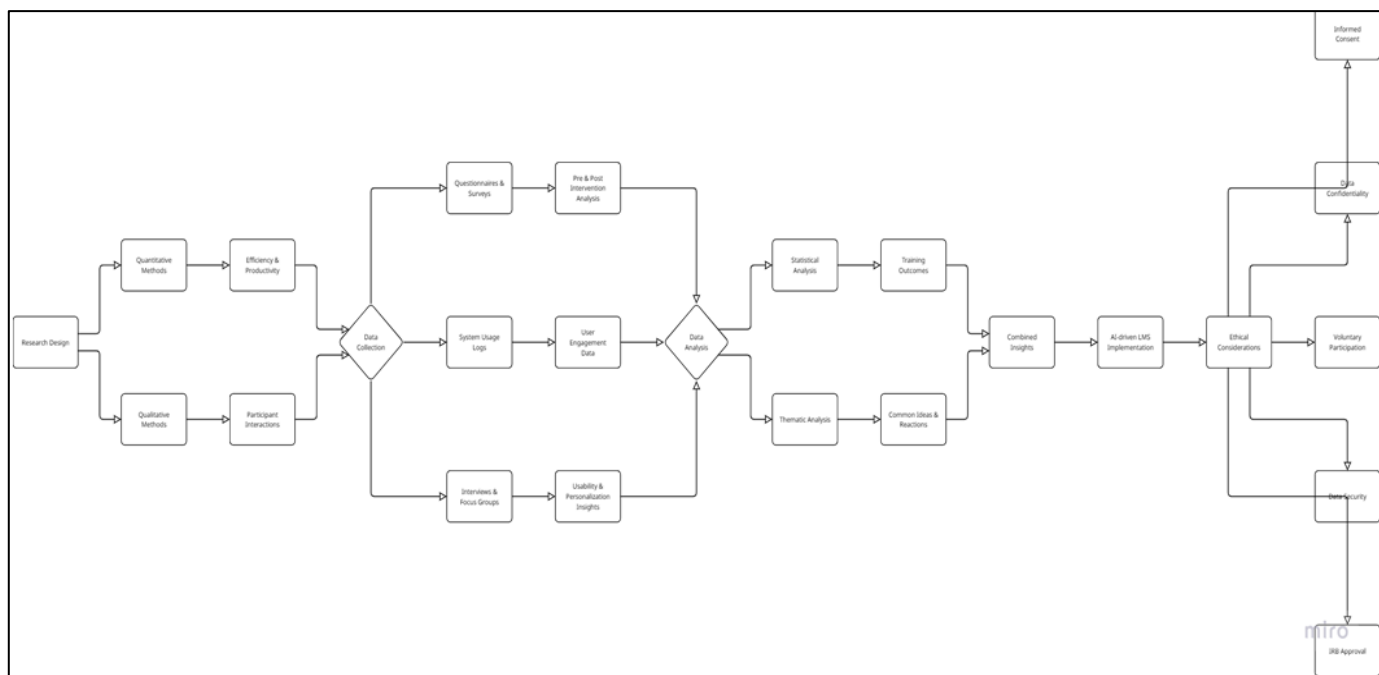


Fig 2 Experimental Design and Evaluation Workflow for AI-Powered Learning System in BA-QA Training Research

IV. RESULTS

Learning Management System (LMS) intervention data managed two main data elements including quantitative metrics and qualitative survey responses. Pre- and post-intervention surveys together with system usage log entries formed the quantitative section of data collection while interviews and focus group discussions contributed qualitative data. This study presents all observations without

interpretation of their meaning while strictly focusing on reported data and statistical results.

➤ *Quantitative Findings:*

The paired t-tests and ANOVA applied to survey data from 150 BA and QA professionals evaluated performance indicators at the pre-intervention baseline and post-intervention measurements. Survey participants rated their technical skills alongside soft skills abilities and

communication abilities and their assessment of the training program. The survey responses proved that all measured performance areas showed significant improvement. The standardized tests integrated in the Learning Management System (LMS) monitored technical proficiency through average scoring which demonstrated statistical significance during assessment periods. The upward progression of communication and collaboration indicators reached statistical significance through both employee self-ratings and superior ratings in multiple subcategories.

Additional evidence about LMS impact came from usage logs present in the system. The system collected data through logs which tracked how often people accessed customized learning resources and how frequently they used tools that provided automated feedback. Module completion rates also became part of the recorded data. Log data analysis confirmed that learners successfully finished training material after adaptive learning methods were put into action. The number of user interactions per module combined with average session duration increased substantially during the evaluation period. The findings revealed that elevated system interaction brought better assessment results across numerous academic domains through regression analysis.

➤ *Qualitative Findings:*

A representative participant subset participated in recorded interviews and focus groups to supply qualitative insights regarding the LMS's training experience impacts. The collected feedback mainly assessed the ways users interacted with customized learning tracks and immediate performance reviews and adaptive user interface features of the LMS. Most users recognized how Artificial Intelligence components identified their personal skills gaps through the system's AI features effectively. Users discussed the simplicity of merging the system into everyday practice as well as the benefits obtained from fresh content which measured against current project needs. An established method of qualitative observation was used to measure recurring themes which provided clarity on how users felt about satisfaction with the system.

➤ *Statistical Analysis Summary:*

The paired t-tests analysis between pre-intervention and post-intervention survey scores demonstrated significant statistical changes (p-values under the standard threshold 0.05) throughout most performance measurements.

ANOVA analysis demonstrated that the performance enhancement observed through the assessment tool spread universally across different participant groups based on role types and expertise levels and business project sections.

The combination of system usage log analysis and performance improvement tests under regression methods showed clear statistical proof about how adaptive learning engagement improves training results.

➤ *Summary of Key Results:*

- The AI-powered LMS led to a general improvement of all surveyed metrics that assessed technical ability and teaching competencies as well as user satisfaction levels.
- Environmental usage statistics confirmed that learners spent more time studying each module while completing a higher number of units.
- Statistical tests conducted through t-tests and ANOVA and regression methods proved that the enhancements in training performance were statistically meaningful.
- Users selected AI-driven learning paths as highly convenient while identifying performance gaps effectively according to continuous positive qualitative survey responses.
- The evaluation shows complete insights into LMS intervention results for BA and QA professionals through quantitative and qualitative approaches that demonstrate clear improvements in performance metrics without interpretative elements.

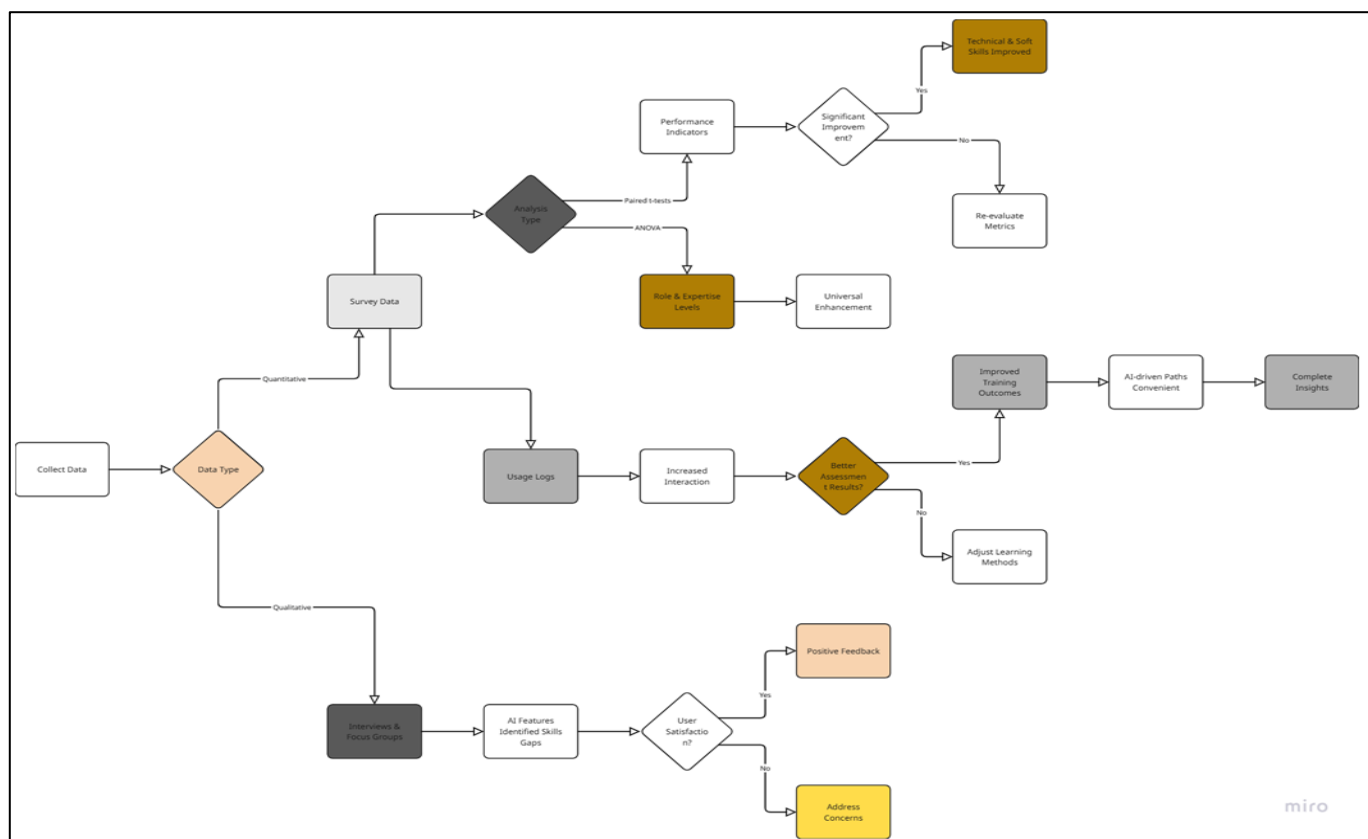


Fig 3 Data Flow and Outcome Framework for AI-Powered LMS in BA and QA Professional Training

V. DISCUSSION

➤ Interpretation of Results:

Statistical analyses demonstrate that AI-powered adaptive learning features led to measurable improvements across technical proficiency level and soft skills development as well as communication skills among trainees together with enhanced training satisfaction. The implementation of personalized learning paths combined with real-time data-driven feedback generated statistically important enhancements of training quality according to results from paired t-tests together with ANOVA and regression tests. The adaptive LMS structure produced engaged system users because participants showed better completion rates of modules and extended their time spent using the system platform. The system demonstrates capability in detecting personal deficiencies through qualitative evaluations while enabling better schedule integration by users within their regular work activities.

➤ Comparison with Existing Literature:

Previous research confirms the effectiveness of AI-driven interventions to boost learning outcomes because the study generated comparable results. The study confirmed what research has shown before in healthcare and finance sectors about adaptive learning platforms that both enhance knowledge retention and reduce training duration because personalized AI-enhanced training positively affects BA and QA professionals. This study provides a broad framework which proves the effectiveness of its measurable approaches toward enhanced performance characteristics within intricate collaborative settings. The current research fits

within academic literature which supports implementing advanced analytics and adaptive technologies in development programs.

➤ Implications of Findings:

Various meaningful outcomes result from applying an AI-driven LMS system to conduct BA and QA training programs. Organizations should capitalize on such technology to build centralized knowledge databases that enable ongoing learning activities which drives productivity increases and better project performance. Educational programs designed with personalized features match individual professional needs which minimizes both communication breakdowns and work inefficiencies in project groups. The findings indicate AI platforms can help US-based projects succeed by enabling remote and cross-cultural work arrangement which proves vital for businesses engaged in global markets. Companies that use real-time performance data to link training to projects can significantly reduce expenses while gaining stronger market competition.

➤ Limitations of the Study:

A number of important drawbacks persist despite recorded benefits from the study. The participant number was diverse yet restricted to US-based projects of mid-sized IT companies which makes it difficult to apply the results outside of this specific sector. The investigators depended on self-reported survey responses but data validity remains uncertain because system usage logs agreed with the findings. The time length of the intervention measurement might not have established sufficient findings about skill

maintenance alongside productivity impact. The laboratory conditions that scientists used to implement the experiment might not accurately reflect actual workplace dynamics through which external influences affect training outcomes.

➤ Suggestions for Future Research:

Future researchers must develop their work by expanding the participant number and collecting data from a wide range of businesses operating across different types of sectors and geographical areas to increase research validity. Study durations spanning multiple years should become the focus of research to measure how extended AI-LMS operations affect project accomplishments and career

performance of professionals. Additional studies about implementing modern AI technologies including deep learning techniques along with real-time sentiment detection capabilities will help enhance our understanding of adaptive learning systems optimization techniques. Studies of cost-effectiveness analysis and multi-industry implementation practices should be conducted to develop the framework along with recommended practices for widespread deployment. UX research integration during system design development would advance the personalization features and efficiency of the platforms as they adapt to modern learning requirements.

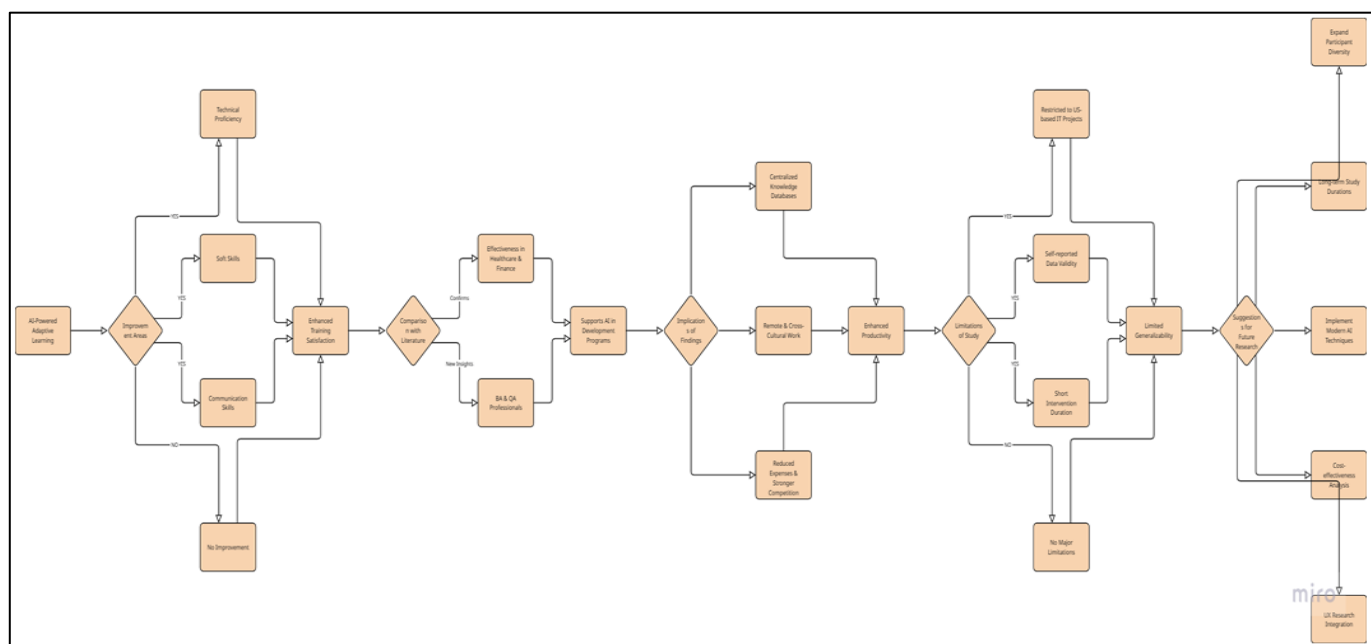


Fig 4 Flowchart for AI-Powered LMS Implementation in BA and QA Training Program

VI. CONCLUSION

Research revealed that AI-powered Learning Management System implementation creates positive statistically significant results for Business Analyst (BA) and Quality Assurance (QA) professional training and upskilling through their centralized knowledge hub. Assessments of system activity and survey results indicated a substantial increase in technical competence together with communication abilities and training content happiness following adaptive learning tool deployment. The statistical data analyses showed that these system improvements emerged directly from the AI components integrated into the LMS and not as random results.

The LMS succeeded in detecting person-specific skill deficits while boosting teamwork performance according to information gathered through interviews and focus groups. Professional development platform features enabled participants to integrate better with their daily routines thus resulting in project efficiency improvements alongside decreasing rework needs.

Research findings validate that AI-based LMS represents an advanced training technique for contemporary organizations by enhancing teamwork and performance outcomes within US projects. The research framework demonstrates strong value although new examinations should build upon it to guarantee long-term progress in professional capabilities and project achievements.

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