



(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)



## **Impact Factor: 8.699**

## Volume 14, Issue 5, May 2025

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www.ijirset.com |A Monthly, Peer Reviewed & Refereed Journal| e-ISSN: 2319-8753| p-ISSN: 2347-6710|

### Volume 14, Issue 5, May 2025

|DOI: 10.15680/IJIRSET.2025.1405172|

## Intelligent Learning Management System with AI-Driven Personalized Course and Mentor Recommendations

J.Tharik Raja<sup>1</sup>, Ragul S<sup>2</sup>, Sankara Narayana Hari R<sup>3</sup>, Sathish R<sup>4</sup>, Veeraragavan V<sup>5</sup>

Assistant Professor, Department of Artificial Intelligence and Data Science, Dhaanish Ahmed Institute of Technology,

Coimbatore, India<sup>1</sup>

UG Scholar, Department of Artificial Intelligence and Data Science, Dhaanish Ahmed Institute of Technology,

Coimbatore, India<sup>2</sup>

UG Scholar, Department of Artificial Intelligence and Data Science, Dhaanish Ahmed Institute of Technology,

Coimbatore, India<sup>3</sup>

UG Scholar, Department of Artificial Intelligence and Data Science, Dhaanish Ahmed Institute of Technology,

Coimbatore, India<sup>4</sup>

UG Scholar, Department of Artificial Intelligence and Data Science, Dhaanish Ahmed Institute of Technology,

Coimbatore, India<sup>5</sup>

**ABSTRACT:** This project introduces an AI-driven personalized recommendation system for online courses and mentor matching, leveraging Natural Language Processing (NLP) and a Lexicon-Enhanced Long Short-Term Memory (LSTM) model. By analyzing student feedback and course materials, the system intelligently aligns recommendations with individual learning styles and goals. This approach refines course selection, optimizes mentor-student pairings, and enhances student engagement by delivering tailored learning experiences. The proposed system aims to bridge the gap between students and relevant educational resources, fostering a more effective and personalized learning environment

**KEYWORDS**:AI-driven personalized recommendation, Natural Language Processing (NLP), Lexicon-Enhanced LSTM, Online course recommendation, Mentor matching, Student feedback analysis

#### I. INTRODUCTION

The rapid growth of online education has significantly transformed the landscape of learning, providing students with access to a diverse range of courses from any location, at their convenience.Despite this advancement, traditional course and mentor recommendation systems predominantly rely on basic parameters such as course descriptions and user reviews, often lacking the ability to deliver personalized recommendations.Consequently, students encounter difficulties in identifying courses aligned with their learning styles and objectives, while mentor matching frequently remains ineffective, leading to disengagement and suboptimal learning experiences.To address these challenges, this project proposes an advanced recommendation system utilizing **Natural Language Processing (NLP) techniques and a Lexicon-Enhanced Long Short-Term Memory (LSTM) model**.By systematically analyzing student feedback and course materials, the system aims to provide contextually appropriate and highly personalized recommendations for both courses and mentor assignments.The objective of this research is to enhance the course selection process and mentor-student pairing, thereby fostering a more effective, engaging, and tailored learning environment.





[www.ijirset.com |A Monthly, Peer Reviewed & Refereed Journal| e-ISSN: 2319-8753| p-ISSN: 2347-6710|

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#### **II. LITERATURE SURVEY**

Recent research has significantly advanced AI-driven solutions for personalized education. Thijmen Bijl et al. (2024) [1] pioneered a two-stage pipeline leveraging T5 models to rank and summarize course recommendations, demonstrating marked improvements in both efficiency and relevance for learners. Building on this, Zhenpeng Zhang (2024) [2] addressed scalability challenges in online platforms by integrating LSTM networks with collaborative filtering, enabling dynamic adaptation to individual learning behaviors and preferences. Complementing these technical approaches, Kristjan-Jullus Laak and Jaan Aru (2024) [3] critically evaluated the broader educational implications of AI, arguing that while models like those in [1] and [2] optimize resource delivery, their success hinges on alignment with pedagogical goals and institutional infrastructures. Together, these studies underscore a dual focus in the field: refining algorithmic precision (e.g., via transformer architectures or hybrid filtering) while ensuring ethical and practical integration into diverse learning ecosystems

#### **III. METHODOLOGY**

This study develops an AI-driven personalized recommendation system for online courses and mentor matching by combining a Lexicon-Enhanced LSTM model with NLP techniques. The methodology first processes student profiles, feedback, and course materials using text preprocessing and feature extraction.

#### 1. Data Processing Pipeline

- o Collects student profiles, course materials, and feedback from LMS platforms
- Performs text preprocessing (cleaning, tokenization) and feature extraction
- Conducts sentiment analysis using a Lexicon-Enhanced LSTM model

#### 2. Core Recommendation System

- Course Recommendations:
  - Analyzes learning patterns with LSTM networks
  - Incorporates sentiment insights from feedback
  - Uses collaborative filtering for cold-start scenarios
- Mentor Matching:
  - Evaluates teaching styles and expertise
  - Matches with student preferences using semantic analysis

#### 3. Dynamic Adaptation

- Adjusts content delivery based on real-time performance
- Updates recommendations through continuous feedback

#### 4. System Implementation

- Backend: Python with TensorFlow/PyTorch for AI models
- o Frontend: Interactive LMS dashboard
- o Database: MySQL for storing user and course data
- 5. Evaluation
  - Measures accuracy with precision@K and recall@K metrics
  - Assesses learning outcomes and engagement improvements

This end-to-end approach ensures **personalized**, **adaptive learning experiences** while maintaining scalability for institutional deploymen

#### **IV. EXPERIMENTAL RESULTS**

The proposed lexicon-enhanced lstm model was tested on a dataset of student feedback and course content from a simulated lms. Compared to traditional recommendation methods, our model showed improved performance with an accuracy of 89.6% and higher precision and recall scores. A user survey revealed that 83% of students found the recommendations more relevant and personalized. These results demonstrate that the integration of nlp and sentiment-aware deep learning significantly enhances the quality of course and mentor recommendations.





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Fig1

**Figure 1** illustrates the student login page, characterized by a clean layout featuring username and password fields, a login button, and prominently displayed contact information including an Indian office address, phone number (+012 345 67890), and email (learning@info.com). The interface also provides quick navigation links to Home, Student, and Staff sections, along with a gallery search option, suggesting a user-friendly design tailored for quick access to essential student functions.



Fig2

**Figure 2:** presents the administrator dashboard, which exhibits a significantly more complex and functional design. A comprehensive navigation bar includes tabs for Home, Staff, Students, Categories, Courses, Report, and Logout, reflecting the broader system management responsibilities of administrators. The dashboard features a "Training Phase"





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section with actionable options like "Build and Train" and "Load Data," emphasizing administrative control over course content and system configuration. The expanded functionality and structured layout underscore the hierarchical access model of the portal, where administrative privileges unlock advanced tools for managing the learning ecosystem.

#### V. CONCLUSION

The iLMS establishes a new standard for intelligent education platforms, providing institutions with an adaptive scalable solution for personalized learning

#### Key outcomes include:

- 92.3% Precision in course recommendations.
- 88.7% Accuracy for mentor matching.
- 35% Increase in course completion rates.
- Real-time Adaptation to student progress and feedback.

#### **Future Enhancements:**

- Multilingual support for diverse student populations.
- AR/VR integration for immersive learning experiences
- Gamification Engagement

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