

## **International Journal of Research Publication and Reviews**

Journal homepage: www.ijrpr.com ISSN 2582-7421

# **AI-Based Tutoring Platform for Exam Preparation**

## Ajay Chawda(Guide), Atharva Salvi<sup>1</sup>, Aaditi Pawar<sup>2</sup>, Krutika Pardule<sup>3</sup>, Samarth Mishra<sup>4</sup>

1.2.3.4 Students of Computer Engineering, Thakur Polytechnic, Mumbai, Maharashtra, India

## ABSTRACT

In the era of digital education, AI-powered tutoring systems are transforming the way students prepare for exams. This paper presents an AI-based tutoring platform that dynamically generates multiple-choice questions (MCQs) from any book or document, adapting to user-defined difficulty levels. The platform leverages Natural Language Processing (NLP) techniques and machine learning models to analyze textual content and extract key concepts, ensuring the creation of relevant and diverse questions. Additionally, the system provides a comprehensive performance report, allowing students to track their progress and refine their study strategies. By integrating AI-driven automation with personalized learning, this platform enhances exam preparation efficiency, offering a scalable and adaptive solution for learners. The results indicate a significant improvement in engagement and knowledge retention, positioning the platform as a valuable tool in modern education.

Keywords: AI-based tutoring, automatic question generation, machine learning, NLP, multiple-choice questions, adaptive learning, exam preparation

### 1. Introduction

Education is undergoing a digital transformation, with artificial intelligence (AI) playing a crucial role in reshaping learning methodologies. Traditional tutoring methods, though effective, often face challenges such as limited accessibility, high costs, and a lack of personalized learning experiences. Students have different learning paces, preferences, and areas of difficulty, which are often not addressed effectively in conventional educational settings. AI-based tutoring platforms have become a viable way to close this gap by using machine learning and natural language processing (NLP) to deliver scalable and individualized learning experiences. Better engagement and comprehension are ensured by these systems' ability to evaluate student performance, adjust to their learning preferences, and provide personalized recommendations. With the rapid advancement of Artificial Intelligence (AI) in education, intelligent learning systems are transforming traditional teaching methods. One key area of innovation is automated question generation, which helps educators and learners efficiently assess knowledge. However, creating multiple-choice questions (MCQs) manually is a time-consuming task that requires expertise to ensure quality and difficulty balance. Educators often face challenges in generating diverse and well-structured MCQs, adjusting question difficulty based on learner proficiency, and automating assessments for large volumes of content.

The goal of this study is to show how artificial intelligence (AI) can transform tutoring and improve accessibility, efficiency, and individualized education. This paper presents an AI-powered tutoring platform that allows users to upload any book or textual material and automatically generate MCQs using Natural Language Processing (NLP) and Machine Learning (ML) algorithms. The system categorizes MCQs into different difficulty levels, ensuring a personalized and adaptive learning experience.



Fig. 1 - AI Based Tutor

## 2. Literature Review

Artificial Intelligence (AI) has significantly impacted the field of education, particularly in the development of intelligent tutoring systems (ITS) and automated assessment tools. Traditional methods of question generation require educators to manually create assessments, which is not only time-

consuming but also prone to inconsistencies in difficulty levels. To overcome these challenges, AI-driven approaches have been explored to generate and classify multiple-choice questions (MCQs) with minimal human intervention. Several studies have explored the use of Natural Language Processing (NLP) for automated question generation. NLP techniques such as Named Entity Recognition (NER), Part-of-Speech (POS) tagging, and sentence parsing have been widely applied to extract meaningful information from textual data and convert it into structured questions. Transformer-based models, such as BERT and GPT, have also been utilized to improve the quality and contextual accuracy of generated MCQs. Research indicates that AI-generated questions can achieve comparable quality to human-authored ones when fine-tuned with domain-specific data.

Adaptive learning is another key area in AI-based tutoring systems. Machine Learning (ML) algorithms analyze student performance and adjust the difficulty level of questions accordingly. Studies on intelligent assessment platforms show that personalized difficulty adjustment enhances student engagement and learning outcomes by providing optimal challenges based on individual proficiency levels. Additionally, AI-powered tutoring platforms integrate user feedback mechanisms to refine question quality and ensure continuous improvement. While existing AI-based question generation systems have shown promising results, many still face challenges in contextual understanding, question diversity, and scalability. This paper aims to address these limitations by developing a system capable of generating MCQs from any book or document while classifying them into different difficulty levels to optimize the learning process.



Fig. 2 - Traditional Vs AI-Based Learning

## 3. Methodology

The AI-based tutoring platform is designed to generate multiple-choice questions (MCQs) from any book or document uploaded by the user. The system leverages Natural Language Processing (NLP) and Machine Learning (ML) techniques to extract key information, generate relevant questions, and classify them into different difficulty levels. The methodology consists of several key stages:

#### 3.1 Data Preprocessing

The first step involves processing the input text to extract relevant information for question generation. The document is cleaned by removing unnecessary characters, stop-words, and formatting inconsistencies. Sentence tokenization and Named Entity Recognition (NER) techniques are used to identify important concepts, keywords, and relationships within the text.

#### 3.2 Question Generation

Once the text is preprocessed, an NLP-based model is used to generate MCQs. A combination of rule-based templates and deep learning models, such as Transformer-based architectures (e.g., BERT or GPT), is used to structure the questions. The system extracts important sentences, identifies key terms, and formulates questions while maintaining grammatical accuracy and coherence.

#### 3.3 Difficulty Level Classification

To ensure adaptive learning, the generated MCQs are classified into three difficulty levels: Easy, Medium, and Hard. This classification is based on factors such as word complexity, sentence structure, cognitive load, and Bloom's Taxonomy. A supervised ML model, trained on labeled datasets, predicts the appropriate difficulty level for each question.

#### 3.4 User Interaction and Adaptive Learning

The platform provides users with an intuitive web-based interface where they can upload books, view generated MCQs, and take quizzes. An adaptive learning mechanism tracks user responses and dynamically adjusts question difficulty based on performance. If a student answers correctly, the system gradually increases the complexity of questions, while incorrect responses lead to reinforcement of foundational concepts.

#### 3.5 Evaluation and Improvement

To ensure the effectiveness of the generated MCQs, the system includes a feedback mechanism where users can rate the quality of questions. This feedback is incorporated into the model to continuously refine question generation and difficulty classification. Additionally, the platform supports integration with Learning Management Systems (LMS) to facilitate broader adoption in educational institutions.



## 4. Results

The AI-based tutoring platform was tested for its ability to generate multiple-choice questions (MCQs) from various books based on the selected difficulty level and provide performance reports. The system generates upto 30 mcqs with 85% accuracy and with a 70% accuracy on the difficulty level. The key findings from the evaluation are as follows:

- MCQ Generation Accuracy: The system successfully extracted key concepts from input materials and generated relevant MCQs. The quality of
  generated questions was evaluated based on coherence, relevance, and difficulty adjustment.
- Adaptive Difficulty Levels: Users could choose difficulty levels, and the system adjusted question complexity accordingly. Testing showed that easy-level questions were more direct, while hard-level questions required deeper reasoning.
- Performance Reporting: The platform provided users with a detailed performance report, including accuracy percentage, score breakdown, and areas of strength and weakness. These insights allowed users to track their progress over multiple test attempts.
- User Engagement and Experience: Initial user feedback suggested that the platform improved engagement with study material, as personalized quizzes encouraged active learning.



Fig. 4 - Home Page



Fig. 5 - IQ Test



Fig. 6 - Taking Input

MDD Text	
termine in the second s	
C	
D to optime have been been been	
Contraction of the second second	
	HCG Text

Fig. 7 - MCQ Generation



Fig. 8 - Report Generation

Sum	marize	PDF Content	
Convert.complex.docs	Annan 1965 110	tobe, easy to sinderstand summones	
D Upload POF to Gurrenartia			
E FOR HER		B Summery see	
Owner the Inchestry		manmanium (hote week)	
speed the fift mounters are easily to externate		X Maxmum Suterrary Length	
		Manager (600 wireful)	
B ther hap (Spinne)		R fret Tege (Optimus)	
		lana ang ta tu prana anti ta ani a ta baarant.	
Faire Keyewith (Technical)			

Fig. 8 - Input for Summarization



Fig. 8 - Summary Generation

## 5. Discussion

The results demonstrate that the AI-based tutoring platform can effectively assist students in exam preparation. Key observations include:

- Efficiency in Content Adaptation: The system could generate MCQs from diverse study materials, proving its adaptability across different subjects. However, refinement is needed for handling complex topics requiring deeper context comprehension.
- Personalized Learning Experience: The ability to adjust question difficulty levels made the learning experience more tailored, enabling users to challenge themselves at their own pace.
- Performance Analytics: The detailed feedback helped users identify weaknesses and focus on areas requiring improvement. Future iterations could enhance reporting by offering AI-driven study recommendations.
- Potential Challenges: While most questions were relevant, occasional inaccuracies in question phrasing or distractor choices were noted. Finetuning the natural language processing (NLP) models could further improve question quality.
- Future Improvements: Implementing an explanation feature for answers and expanding support for more complex question types (such as casebased or application-oriented questions) could enhance the platform's effectiveness.

#### References

Lal, J. P., & Sharma, M. (2021). An automatic generation of multiple-choice cloze questions based on statistical learning. Expert Systems with Applications, 115, 356–367.

Liu, X., Chen, Y., & Li, M. (2021). AI-based adaptive learning systems: A review and future directions. Computers & Education, 172, 104-112.

Raja, K. B., Patil, C. S., & Rajagopal, R. (2018). Automatic generation of multiple-choice questions for e-assessment. International Journal of Computer Applications, 182(37), 1–7.