

EduQuest-Educational Question generation and Test Automations Using AI

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<p>Peer Review Information</p> <p><i>Type: Article</i> <i>Received: 22 March 2026</i> <i>Revised: 06 April 2026</i> <i>Accepted: 24 May 2026</i> <i>Published: 05 June 2026</i></p>	<p style="text-align: center;">Abstract</p> <p>This paper presents EduQuest, an AI-driven framework designed for automated question generation and test management. The system leverages advanced Natural Language Processing (NLP) models and Large Language Models (LLMs) to generate high-quality, context-aware questions from diverse learning materials such as textbooks, lecture notes, syllabi, videos, and digital resources. By incorporating multiple question formats, including multiple-choice, fill-in-the-blank, short-answer, and coding questions, EduQuest supports adaptive testing aligned with curriculum objectives. Furthermore, the platform automates test assembly, delivery, grading, and feedback, reducing the workload on educators while ensuring fairness, consistency, and scalability.</p> <p>Keywords: Question Generation; Test Automation; Artificial Intelligence in Education; Natural Language Processing; Adaptive Assessment; Educational Analytics.</p>
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Introduction

Assessment is a crucial element of education, as it helps measure student learning and guides teachers in improving instructional methods. However, preparing question papers, grading tests, and providing timely feedback are often repetitive and time-consuming tasks for educators. These challenges become even greater in large classrooms or digital learning environments where the demand for quick, fair, and scalable assessment is high. With the rapid growth of artificial intelligence and natural language processing, new opportunities have emerged to automate these processes. AI can analyze learning materials, extract key concepts, and generate meaningful questions in different formats such as multiple-choice, fill-in-the-blank, and short answer. This not only saves time but also ensures consistency, fairness, and alignment with learning objectives.

EduQuest builds on these advancements by offering a complete framework for question generation and test automation. Its goal is to make assessments more efficient, scalable, and adaptive, while reducing the workload of educators and supporting personalized learning experiences. By combining NLP, machine learning, and automation, EduQuest represents a step toward the future of intelligent, data-driven education. In addition to improving efficiency, AI-powered educational assessments can enhance learning outcomes by providing students with personalized feedback and tailored study recommendations. Instead of waiting for results days or weeks after an exam, learners can instantly view their performance, identify weak areas, and receive guidance on how to improve. This fosters a continuous learning cycle that benefits both students and teachers. While the promise of AI in education is vast, it is also important to acknowledge potential challenges. Concerns such as the accuracy of automatically generated questions, the risk of bias in AI models, and issues of data privacy must be carefully addressed to ensure ethical and effective deployment. By tackling these challenges and focusing on responsible AI use, EduQuest aims to strike a balance between innovation and trustworthiness.

Literature Survey

1. EduQuest- A Smart Ed-Tech Platform (2025). Aadesh Narawade, Aditya Dange, Mansi Baviskar, Sanket Mole, Prof. Mrs. Supriya Balote(2025) :Traditional online learning systems struggle with real-time assessments, lack of adaptability, delayed feedback, and inefficient evaluation processes. These issues lead to poor engagement, difficulty in assessing student understanding during lectures, and one-size-fits-all assessments
2. JEduQuest: A Smart Ed-Tech Platform- (2022) Aadesh Narawade, Mansi Baviskar, Sanket, Prof. Supriya (2024): Enhances the EduQuest platform with AI-based question generation and assessment, focusing on adaptive learning and real-time student analytics.
3. Generative AI and Its Impact on Personalized Intelligent Tutoring Systems- Subankar Maity, Aniket Deroy (2024): Explores the integration of generative AI with intelligent tutoring systems to improve adaptability and personalization.
4. Artificial Intelligence-Enabled Intelligent Assistant for Personalized and Adaptive Learning in Higher Education-Sajja, Yusuf Sermet, Muhammed Cikmaz (2023): Introduces an AI-powered adaptive learning assistant to provide personalized support in higher education.
5. EduQuest: A Smart Ed-Tech Platform - Aadesh Narawade (2023) Describes an AI-based platform that combines question generation and assessment to address the lack of personalized and AI-enabled exam systems.
6. Automating Question Generation from Educational Text-Ayan Kumar Bhowmick, Ashish Jagmohan (2022) : Presents an AI-based system trained on educational texts to automate question generation, improving scalability and contextual accuracy over traditional methods.
7. A Transparency Index Framework for AI in Education- Muhammad Ali Chaudhry, Mutlu Cukurova, Rose Luckin (2022): Proposes a transparency index framework to address the lack of transparency and accountability in AI systems used in education.
8. Guiding the Growth: Difficulty-Controllable Question Generation through Step-by Step Rewriting -Cheng et al., ACL 2021. Reframes difficulty as the number of inference steps and generates questions by progressively rewriting (single-hop → multi-hop) under an extracted reasoning chain useful if you want difficulty control / multi-hop questions in EduQuest.
9. Answer-focused and Position-aware Neural Question Generation -Sun et al., EMNLP 2018. Proposes an answer-aware seq2seq model that explicitly models interrogative-word selection and answer-position signals to reduce irrelevant copying and improve question relevance. Great foundational paper for answer-focused QG.
10. Improving Neural Question Generation using Answer Separation -Kim et al., 2018 . Introduces “answer separation” (replace target answer with a token) and a keyword-net to generate questions that don’t accidentally copy the answer; useful technique for cleaner QG.

Limitations of Existing Work

- Manual Question Creation: Most existing educational platforms rely on teachers or content creators to manually design and input questions. This is time-consuming, repetitive, and prone to human error.

- **Limited Personalization:** Traditional systems cannot tailor questions based on a student's learning level, previous performance, or weak areas. All learners receive the same set of questions, reducing the effectiveness of assessments.
- **Lack of Automation:** The process of generating question papers, conducting tests, and evaluating results is often done manually or semi-manually. This increases the workload for educators and delays feedback for students.
- **Static Question Banks:** Many existing platforms use predefined question banks that become outdated quickly. They do not adapt to new syllabus updates or evolving learning patterns.
- **Inconsistent Question Quality:** Human-generated questions may lack proper difficulty gradation, relevance, or variety. This can affect the quality and fairness of assessments.
- **Limited Support for Multiple Formats:** Manual question creation focuses mostly on MCQs or descriptive questions. Complex question types like comprehension-based or scenario-driven questions are difficult to design without AI support.

Problem Statement

In the current educational system, creating high-quality and diverse assessment questions is a time-consuming and repetitive task for educators. Manual test preparation requires significant effort for reading, understanding, and framing questions aligned with learning objectives. This often leads to limited question variety, subjective bias, and difficulty in maintaining consistent difficulty levels across assessments. Additionally, evaluating large volumes of answers especially in large classrooms becomes tedious and prone to human error. Educators face challenges in generating diverse question types (MCQs, fill-in-the-blanks, short answers and coding Questions) for different difficulty levels. Test preparation and evaluation require significant effort, leading to delayed feedback for learners. There is a lack of automated systems that can analyze study material and create high quality, context-aware questions with minimal human intervention.

Proposed System

The proposed system aims to predict real estate prices by analyzing historical data on property features and external factors. By utilizing deep learning and regression techniques, the system can improve the accuracy of predictions, helping real estate buyers, sellers, and investors make informed decisions.

Algorithm:

Step-1: User Registration

Step-2: Content Upload

Step-3: OCR & Text Extraction

Step-4: Text Preprocessing

Step-5: Knowledge Extraction

Step-6: Question Generation

Step-7: Answer Generation & Validation

Step-8: Test Assembly

Step-9: Test Delivery & Automation Step-10: Performance Analytics

System Requirements

1. Database Requirements : Mongodb

2. Software Requirements(Platform Choice):

- Programming Language: Python 3.8+
- IDE: VS code
- Python Libraries : Pandas, Numpy, Tensorflow, Keras, Scikit-learn.
- Flask/sqlite
- Frontend (for UI): HTML, CSS, JavaScript
- Cloud services (AWS/Google Cloud)
- Pycharm

3. Hardware Requirements:

- Processor: Intel Core i5/i7 or AMD equivalent (min 4 cores)
- Memory: 16 GB RAM (32 GB or more recommended)
- Storage: 512 GB SSD (1 TB or more recommended)
- Graphics Card: NVIDIA GeForce GTX 1060 or AMD Radeon RX 580 (min 6 GB VRAM)
- Operating System: 64-bit Windows 10 or Linux (Ubuntu, CentOS)

System Architecture

The proposed system is an AI-based educational content processing system designed to automate the generation and delivery of learning materials such as quizzes, tests, and assignments from uploaded files or videos.

The system begins with the input layer, where the user uploads educational content in the form of documents or videos. This content acts as the primary data source for further processing.

Next, the system enters the AI processing layer, which is the core component of the architecture. In this layer, Natural Language Processing (NLP) techniques are used to understand and interpret the textual content. The system then performs concept extraction, where key topics, keywords, and important concepts are identified. Based on these extracted concepts, the system carries out automatic question generation, creating different types of questions such as multiple-choice questions, short answers, and descriptive questions.

After processing, a decision module determines whether the generated data should be stored in the database. If the decision is positive, the processed content, including questions and extracted concepts, is stored for future use and retrieval. If not, the system proceeds without storing the data.

The next stage is the teacher review module, where the generated content is validated by a teacher. The teacher can modify or approve quizzes, tests, assignments, and other learning materials to ensure accuracy and quality.

Once approved, the content moves to the delivery layer, where it is provided to students through a learning platform such as a web application or mobile app.

Finally, the system includes a feedback and performance analysis module, where student responses, scores, and feedback are collected. This data helps in evaluating student performance and improving the system's efficiency. The feedback can also be reused to enhance future AI processing, forming a continuous improvement loop.

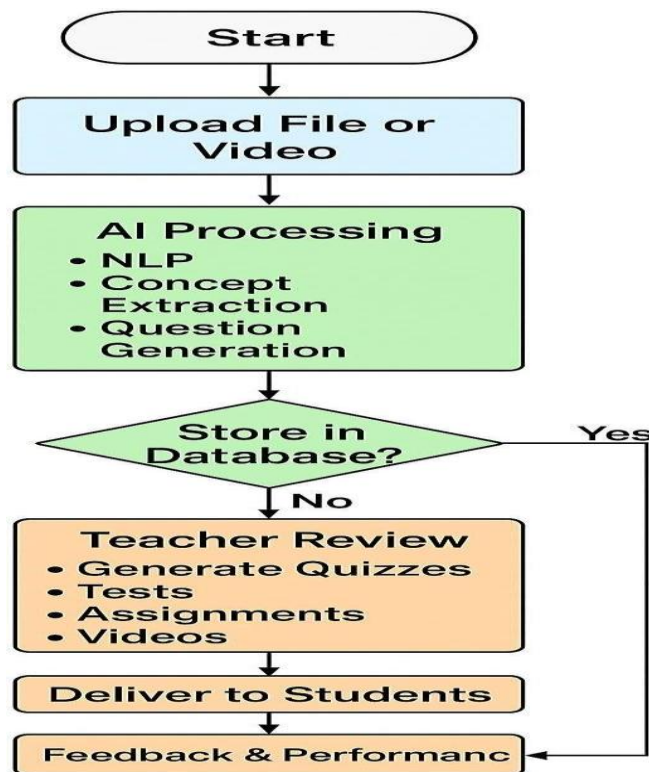


Fig 1. System Architecture

AI-Based Question Generation

1. Study Material Input: Teachers upload study materials such as notes, documents, or text paragraphs. The system accepts educational content related to different subjects and topics.
2. Text Preprocessing: Clean the input text by removing stopwords, punctuation, and unnecessary symbols. Tokenize sentences and words for better text analysis.
3. Natural Language Processing (NLP): Apply NLP techniques to extract important keywords and sentences. Identify main

concepts and topics from the study material.

4. Question Generation Model: Generate different types of questions automatically such as: Multiple Choice Questions (MCQ) Short Answer Questions Descriptive Questions
5. Difficulty Level Assignment: Classify generated questions into easy, medium, and hard levels based on sentence complexity.
6. Output: Display generated questions to the teacher. Teachers can review, edit, or save questions for assessment creation

Automated Test Creation

1. Question Selection: Teachers select questions from the generated question bank.
2. Test Configuration: Define test parameters such as subject name, number of questions, marks, and time duration.
3. Test Generation: The system automatically creates a structured question paper or online test.
4. Test Storage: Generated tests are stored in the database for future use.
5. Output: Teachers can download the generated question paper or conduct online tests for students.

User Authentication System

1. Login Authentication: The system verifies user credentials using secure authentication mechanisms.
2. Session Management: After successful login, a secure session is created for the user.
3. Access Control: Only authorized users can access question generation and test management features.
4. Output: Users are redirected to the dashboard to manage study materials and assessments.

Question Management System

1. Question Storage: All generated questions are stored in a database categorized by subject and topic.
2. Question Editing: Teachers can modify or delete questions if required.
3. Question Retrieval: The system allows teachers to search and filter questions based on topics or difficulty levels.
4. Question Reuse: Stored questions can be reused for creating multiple tests or assignments.
5. Output: A structured question bank is maintained for efficient assessment creation

Result Discussion

The Result module displays the student's performance after completing the MCQ test. It shows the total score, correct and incorrect answers, and overall evaluation, helping students understand their learning progress and improve their performance.

Results / Outputs

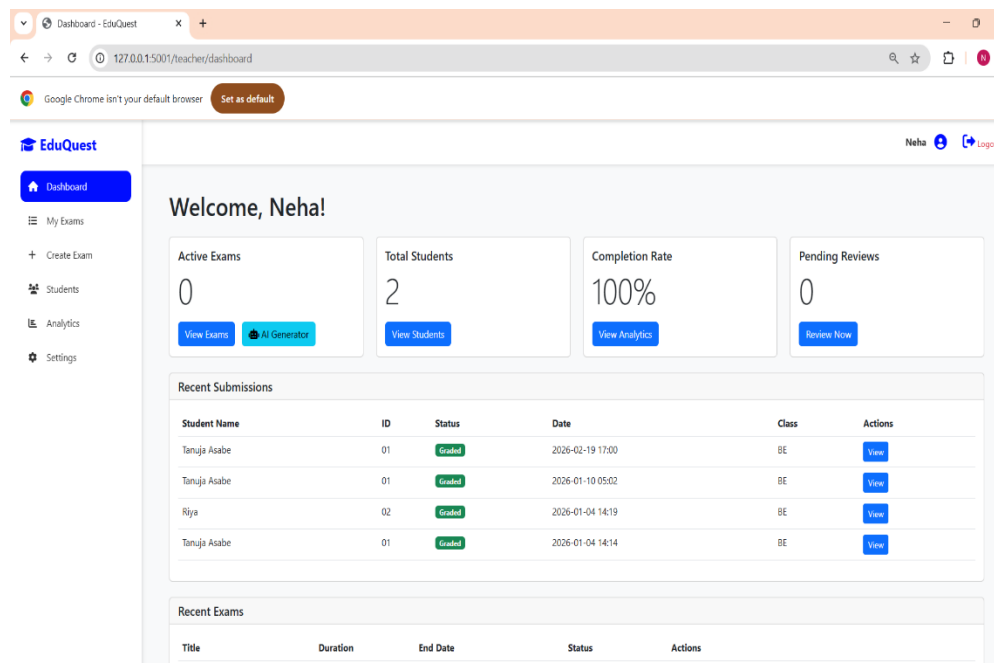


Fig. 2. Teacher Dashboard Interface

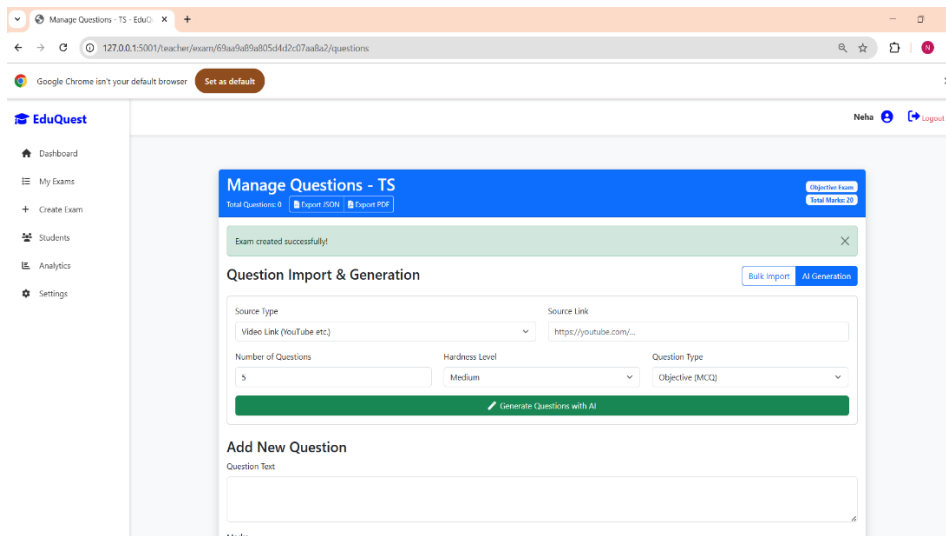


Fig. 3. AI-Based Question Generation Module

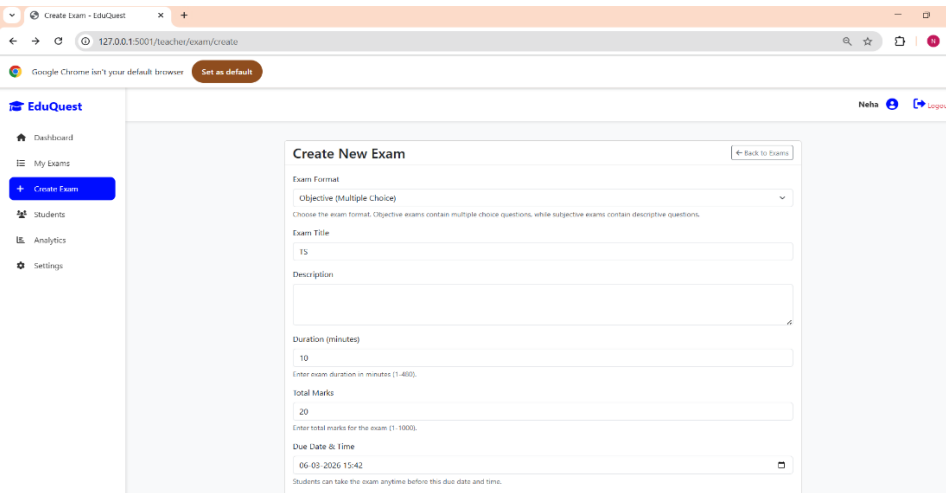


Fig. 4. Examination Creation Interface

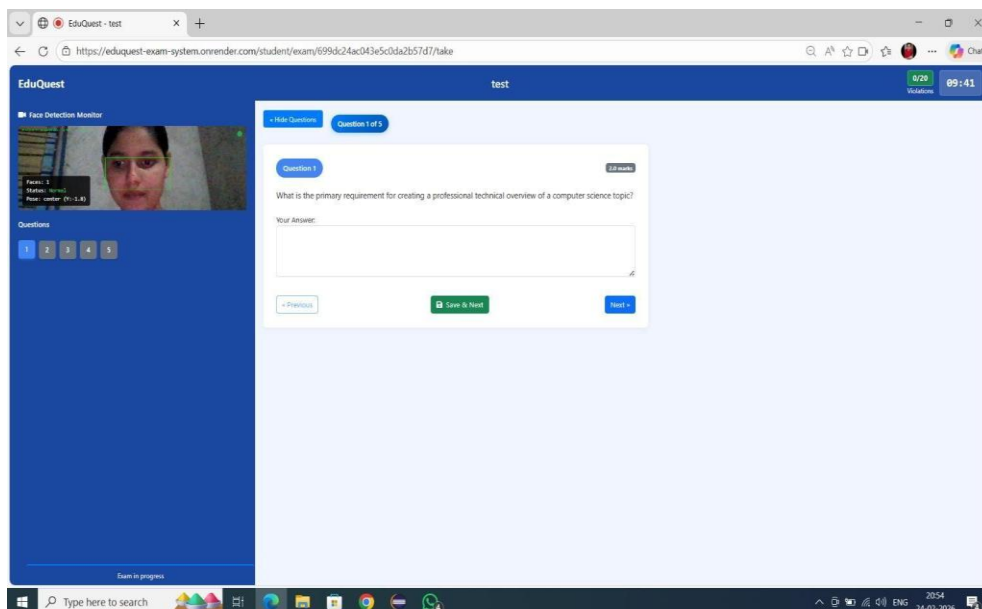


Fig. 5. Online Examination and Proctoring Interface

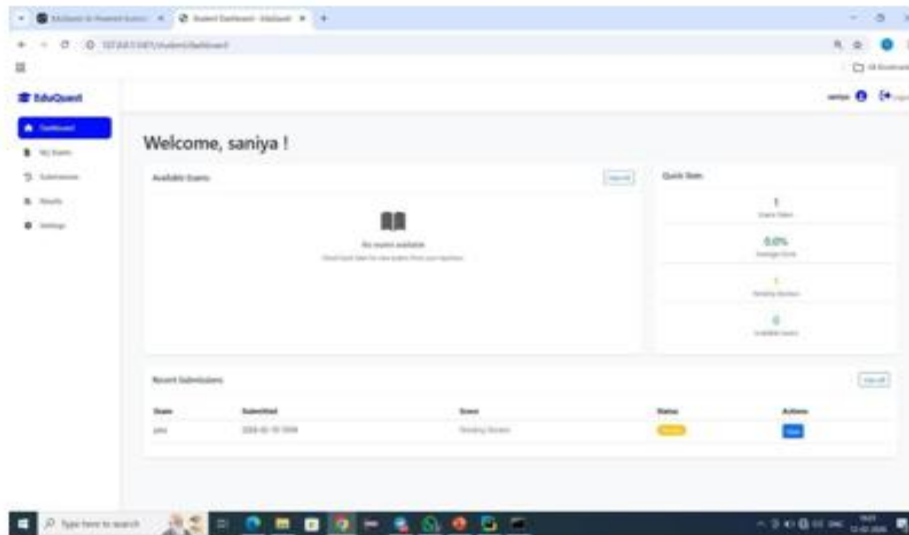


Fig. 6. Student Dashboard Interface

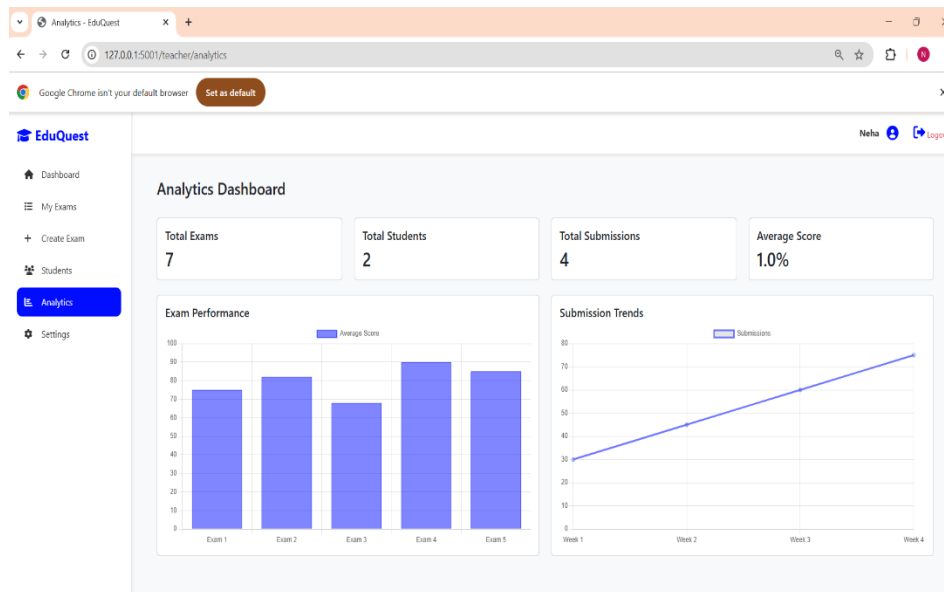


Fig. 7. Educational Analytics Dashboard

Conclusion

EduQuest– Educational Question Generation and Test Automation using AI is a significant advancement in the field of educational technology. It leverages artificial intelligence to automate the creation of questions and tests, enabling educators to save time and focus more on teaching and mentoring. The system provides personalized learning experiences by generating questions tailored to individual student performance and delivers instant evaluation, helping students identify their strengths and weaknesses efficiently. By ensuring consistency and standardization, EduQuest reduces human errors and biases in assessments while offering scalability to handle a large number of students across diverse educational settings. Additionally, it generates data-driven insights, allowing educators to monitor progress, identify learning gaps, and make informed decisions for curriculum improvement.

Despite its limitations, such as dependency on quality input data and technical complexity, EduQuest has wide-ranging applications in schools, colleges, online learning platforms, competitive exam preparation, and corporate training. Overall, this project demonstrates how AI can enhance the effectiveness, efficiency, and adaptability of the educational assessment process, contributing to smarter and more innovative learning environments.

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