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**Exploration of EduQuest – An AI-Powered System for Question Generation and Test Automation**

<sup>1</sup>Mr. Jalindar N. Ekatpure , <sup>2</sup>Asabe Tanuja , <sup>3</sup>Gaikwad Riya , <sup>4</sup>Nagare Neha

<sup>1 2 3 4</sup> S.B Patil College Of Engineering, Indapur

Email: [j.ekatpure@gmail.com](mailto:j.ekatpure@gmail.com) , [tanujaasabe@gmail.com](mailto:tanujaasabe@gmail.com) , [gaikwadriya138@gmail.com](mailto:gaikwadriya138@gmail.com) ,

[nnagare2003@gmail.com](mailto:nnagare2003@gmail.com)

Peer Review Information	Abstract
<p><i>Submission: 11 Sept 2025</i></p> <p><i>Revision: 10 Oct 2025</i></p> <p><i>Acceptance: 22 Oct 2025</i></p> <p><b>Keywords</b></p> <p><i>Question Generation, Test Automation, Artificial Intelligence in Education, Natural Language Processing, Adaptive Assessment, Educational Analytics</i></p>	<p>The increasing adoption of artificial intelligence in education has transformed traditional assessment practices by enabling automation, personalization, and efficiency in evaluating student learning. 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, syllabus and digital resources.</p> <p>By incorporating multiple question formats such as multiple-choice, fill-in-the-blank, and short answer and also 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 and scalability. A key feature of EduQuest is its integration of machine learning techniques for difficulty estimation, distractor generation, and performance prediction, enabling personalized assessments tailored to individual learner profiles.</p> <p>The system not only enhances the reliability and objectivity of examinations but also fasters continuous learning by providing instant feedback and analytics to students and instructors. This paper reviews existing approaches, highlights the unique contributions of EduQuest, and outlines future opportunities for expanding AI-powered educational assessment tools to hybrid and online learning environments.</p>

**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** - 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. EduQuest: A Smart Ed-Tech Platform-** 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.

**8. 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.

**9. 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.

**10. 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.

**11. 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.

## Research Gap

- **Lack of curriculum alignment** : Existing systems rarely ensure generated questions align with syllabus and learning objectives.
- **Poor handling of noisy/multimodal inputs**: Difficulty in processing scanned PDFs, slides, videos, and handwritten

notes.

- **Limited higher-order cognitive question generation:** Focus mainly on recall-level questions rather than analysis, evaluation, or synthesis.
- **Weak distractor generation in MCQs:** Most distractors lack plausibility and fail to reflect common misconceptions.
- **Inadequate adaptive testing:** Systems do not generate questions based on student proficiency or learning path.
- **Lack of explainability and verification:** Generated answers may be incorrect or lack proof of correctness
- **Limited support for skill-based/procedural questions:** Weak in generating coding, lab, or problem-solving step questions.

### 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.

### CONCLUSION

EduQuest AI demonstrates the potential of artificial intelligence to transform traditional educational assessment methods. By automating question generation and test administration, the system significantly reduces manual effort, minimizes human bias, and ensures consistent evaluation across diverse learners. The integration of AI not only streamlines the assessment process but also enables adaptive and personalized learning experiences, catering to individual student needs.

The project showcases how technology can enhance efficiency, accuracy, and scalability in educational environments, making it a valuable tool for educators and institutions. In the future, expanding the system with advanced analytics,

performance tracking, and AI-driven feedback could further enrich the learning experience, fostering a more engaging and effective educational ecosystem.

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