Practice Pal: An AI-Powered Practice Test Platform for Learners

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Abstract

Practice Pal is an intelligent educational mobile platform that aims to improve students' academic preparation and self-assessment in a variety of subject areas. Based on user-defined data, the platform uses developments in artificial intelligence to dynamically create tests and personalised course content. It offers a simplified and flexible method of learning by incorporating elements like automatic grading, immediate feedback, and test revision possibilities. Practice Pal offers a flexible and customised assessment environment that is appropriate for students of all ages, catering to a wide range of users from elementary school pupils to college students.

Providing a personalised, learner-centred educational experience is Practice Pal's main goal. Users receive a structured course outline with pertinent content that is suited to their academic level after entering a subject. The platform makes it possible to create practice tests that closely match with the designated content based on this outline. Test results are assessed in real time, and students receive immediate feedback to help them pinpoint their areas of strength and growth. Additionally, users can review past attempts, assess their mistakes, and repeat tests as necessary. Through reflection and repetition, this iterative process encourages deeper learning and retention, which is consistent with modern pedagogical models that prioritise student autonomy and adaptable learning.

Introduction

Today's learners desire more personalised and adaptable learning experiences, which traditional teaching and evaluation approaches often fail to provide. By offering an AI-powered environment where students can independently create structured course materials and participate in self-assessment, Practice Pal fills this gap. Practice Pal sets itself apart with its clever, user-focused design as the need for digital and mobile-based learning solutions keeps growing. The platform promotes academic confidence and autonomy by improving accessibility, encouraging self-paced learning, and giving students the tools they need to take charge of their education.

Literature Review

In recent years, there has been a significant rise in the use of artificial intelligence in educational technologies. In their discussion of the moral dilemmas AI poses for K–12 education, Akgun and Greenhow [1] stress the significance of creating student-centered tools that improve learning without jeopardising data privacy. Because of their community-shared flashcards and ease of use, Quizlet and similar tools have gained a lot of traction [3]. However, they are unable to construct dynamic, customised

examinations; instead, they rely on static user-generated content. Similar to this, platforms such as Khan Academy offer planned lessons and assessments [4], but they are pre-made and cannot be altered to meet the needs of different learners.

The language-learning program Duolingo has effectively gamified instruction and promoted consistent practice with brief tasks and feedback [5]. Its material, however, is restricted to language study and does not provide users with the freedom to choose their own learning topics or pathways. Moreover, adaptive learning systems, as investigated by Aleven et al. [2], demonstrate how AI can be used to customise learning experiences, even though their use has frequently been limited to particular fields and institutional setups.

Despite these developments, platforms that let users, especially primary to undergraduate students, to input their own subjects, receive structured information generated by AI, and participate in dynamic, test-based learning are still clearly lacking. By using the LLaMA 2 7B Chat model to generate course outlines and practice tests on demand and adding features like test review, retesting, and automatic grading and feedback, Practice Pal aims to close this gap. By doing this, it seeks to develop a more adaptable and sophisticated self-assessment instrument that gives students the ability to direct their own education.

Justification

Generative AI in education offers an adaptable setting for learning that boring material cannot match. Practice Pal provides content that is extremely relevant and personalised by matching a user's specified discipline and level through the usage of LLaMA 2 7B Chat. Flutter's mobile-first strategy ensures accessibility, particularly in areas with poor PC connectivity. Strong backend flexibility and safety are offered by Java Spring Boot for managing user data and AI interactions.

Related Work

Quizlet is a popular online learning platform that lets users create, share, and study personalised flashcards. It has multiple study modes, including fill-in-the-blank questions, multiple-choice quizzes, and matching games. Quizlet's primary drawback is that it is fixed, which might not be in line with users' learning objectives or skill levels. It also doesn't have the ability to create adaptive tests or detailed feedback, and it doesn't use artificial intelligence to dynamically personalise it.

Khan Academy is a learning website that provides in-depth video courses and practice tasks in a number of areas. Its testing component, however, is strict and preset, which restricts its potential to be tailored to the needs of specific students or uncommon topics not addressed in the core curriculum.

Duolingo is a gamified language-learning program that teaches grammar, pronunciation, and vocabulary through interactive courses, voice recognition, and spaced repetition. However, users are unable to develop or request assessments based on random or self-defined content, and its test and quiz systems are limited to its own curriculum. The use of Duolingo is restricted to language learning; it offers no flexibility for testing in other contexts.

Objectives

- To generate test questions based on user-specified subjects and topics using AI.

- To automate the marking process and provide instant feedback upon test submission.

- To enable students to track their performance and learning progress over time.

- To allow users to revise and retake previous tests for continuous improvement.

Methodology

To evaluate the effectiveness and functionality of the Practice Pal platform, two representative academic disciplines were selected for test generation and assessment: Mathematics for Primary School Level and Computer Science for High School Level. These courses were designed using structured outlines generated by the LLaMA 2 7B Chat model via Ollama, based on input prompts provided through the mobile application.

The core input parameters used to generate a practice test included:

- the selected course,
- a custom test name,
- the desired number of questions, and
- the difficulty level (e.g., EASY, MEDIUM, HARD, VERY_HARD).

For the first test case, the selected course was *Mathematics for Primary School Level*. The test was titled *"Test 1"*, configured to contain five questions with a difficulty level set to EASY. Upon submitting this input through the Flutter-based frontend, the request was transmitted to the backend API developed in Spring Boot, which then relayed the prompt to the AI model. The platform responded by generating a structured five-question assessment under the given parameters, which was then displayed to the user via the mobile interface.

The user then completed *Test 1* by providing answers to all five questions. Upon submission, the backend executed an automatic grading procedure. Each user response was compared against the correct answer stored in the backend. A running count was maintained to track the number of correct answers. The final score was calculated by dividing the number of correct answers by the total number of questions, and then converting it into a percentage format.

The graded test results were returned to the user immediately through the frontend interface. The feedback included the total score, individual question performance, and the correct answers for comparison. Based on these results, the user was given two options: to revise the test by reviewing explanations and identifying mistakes, or to retake the test entirely. This methodology was repeated with the second course, *Computer Science for High School Level*, to validate the platform's behavior across different subjects and difficulty levels.
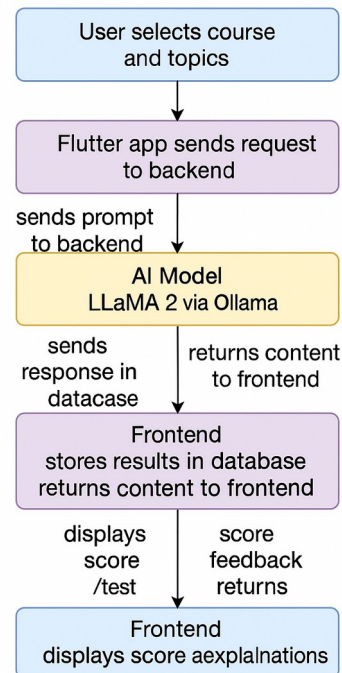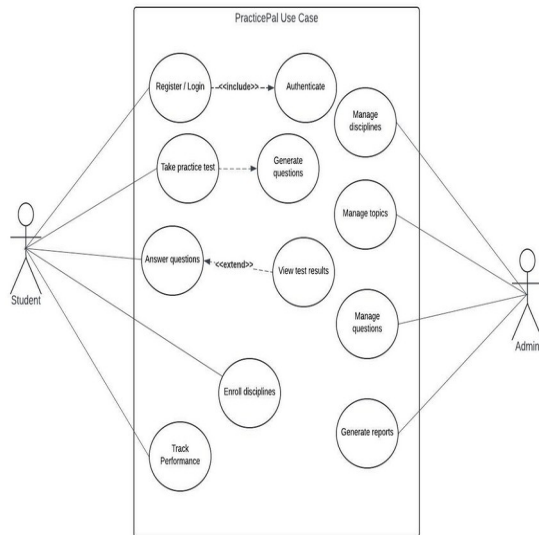

Figure 1: Workflow overview

Figure 2: Use-case diagram

Practice Pal's frontend is made with Flutter, which allows it to work on both iOS and Android smartphones. It shows the course material, controls all user interactions, and offers a user-friendly interface for navigating and finishing practice exams.

Essential functions including user authentication, data management, test result processing, and communication with the AI services are managed by the backend, which is constructed using Java Spring Boot. It serves as the main mediator between the AI module, database and the frontend.

Through Ollama, the AI module makes use of the LLaMA 2 7B Chat model. It generates organised course outlines along with appropriate test questions based on user-generated prompts from the backend. This module makes sure that the content produced is appropriate for the learner's needs and responsive to context.

PostgreSQL is used by the database component to safely store course data, performance analytics, test history, and user profiles. It makes it possible to track learning progress over time and retrieve information efficiently across sessions.

Results

The testing procedure conducted using the *Practice Pal* platform demonstrated the successful functionality of AI-driven test generation, automated grading, and feedback delivery. Two tests were created and executed, each corresponding to a different discipline and educational level: *Mathematics for Primary School Level* and *Computer Science for High School Level*. The tests were generated based on input parameters including course title, test name, number of questions (set to five), and difficulty level (set to "EASY").
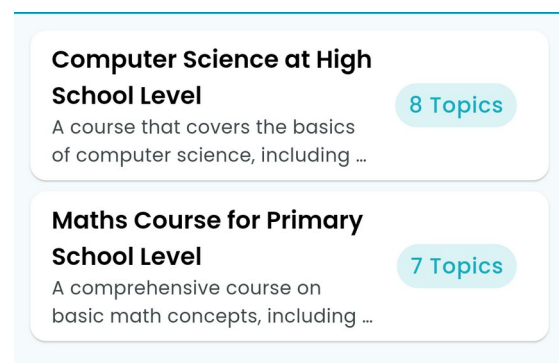

Figure 3: Courses page snippet

Test Generation

The software produced appropriate, well-structured questions for both exam situations that matched the course material. The Ollama-integrated LLaMA 2 7B Chat model generated logical multiple-choice questions and responded promptly to backend cues. The test output demonstrated the AI's dependability in producing educational tests across disciplines by having correctly prepared questions with well defined options and the right answer for each item.
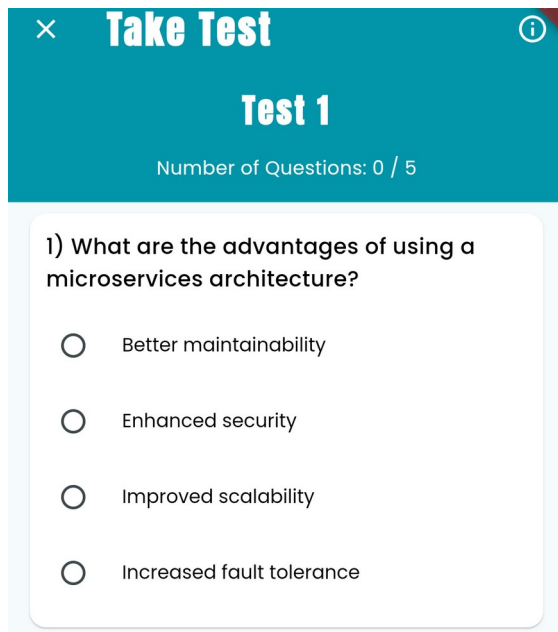
Figure 4: Test page snippet

Test Completion and Scoring

The platform accurately evaluated the results when the tests were completed and submitted. The final result was calculated as a % by the automatic grading algorithm, which accurately matched user replies with the stored correct answers. A sample completion for Test 1 (Mathematics) produced an overall score of 80% with four out of five correct answers. In the same way, the system processed the results of the Computer Science test and promptly provided them without any errors in the calculations.
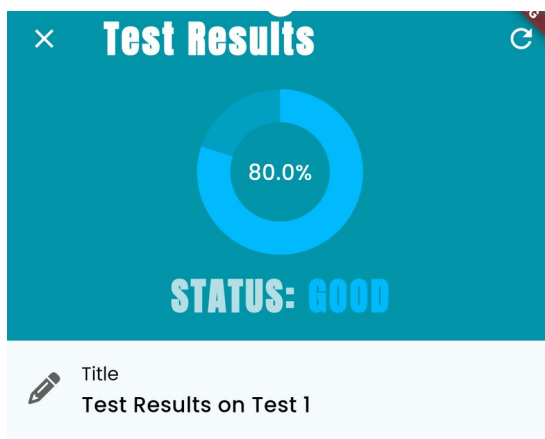

Figure 5: Test results page snippet

Manual Accuracy Testing

A manual accuracy test was carried out to evaluate the consistency and dependability of Practice Pal's AI-based test generation capability.It entailed using the same input data format (i.e., subject, questions, and difficulty) to set up a set of ten distinct tests across various subjects and difficulty levels.Every test that was generated was examined for logical validity of the options and answers, topical appropriateness, question difficulty appropriateness, and structural adequacy.Nine out of ten tests that were generated met all criteria and were deemed to be both valid and educationally appropriate, meaning that the manual validity rate was 90%.This implies that the AI model processes prompts with a high degree of accuracy and produces well-formed, contextually relevant evaluations. In terms of unclear question phrasing, there was one anomaly. This is a recognised drawback of generative AI and will be fixed in subsequent iterations with extra content validation layers or instructor review tools.

Conclusion

A significant development in the use of artificial intelligence in individualised education and assessment is Practice Pal. The platform provides a versatile, user-friendly solution that is suited to the various learning requirements of students ranging from primary school to undergraduate by combining cross-platform mobile development with robust backend services and an AI-driven content generating technique. It stands out from other educational resources due to its capacity to create course content dynamically, generate appropriate tests, offer immediate assessment and feedback, and support several learning cycles. Practice Pal meets a significant and growing need in modern education as students look for more flexible and independent learning spaces. Future improvements, such as language support,

customised paths to learning, and more advanced analytics, have the potential to boost the platform's accessibility and influence globally.

Future Directions and Integration of Advanced Technologies

Practice Pal plans to increase user reach and accessibility by launching a responsive web version in addition to its mobile app. This will give students greater study freedom by enabling them to access the platform from any device, including PCs and tablets. Additionally, issues like entering longer comments or navigating through thorough data and study materials will be easier to use with the web-based interface.

Furthermore, the platform will incorporate natural language interaction features, enabling users to submit questions or outline learning goals in plain English. The AI will then evaluate these inputs to produce unique exam questions or course materials. For younger students or those who are not experienced with formal learning systems, this conversational interface will lower the entry barrier.

Learners will be able to create or join study groups, share sample tests, work together on course outlines, and challenge one another in a gamified setting as part of the support for collaborative learning. To guarantee accessibility for all students, gamification components, voice-to-text, and text-to-speech will be incorporated.

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