



(RESEARCH ARTICLE)



AI-driven English language learning: Leveraging applications/APIs for dynamic content and feedback

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World Journal of Advanced Research and Reviews, 2024, 22(03), 1611–1616

Publication history: Received on 09 May 2024; revised on 23 June 2024; accepted on 25 June 2024

Article DOI: <https://doi.org/10.30574/wjarr.2024.22.3.1882>

Abstract

In our interconnected world, language proficiency is crucial for communication and cultural exchange. Digital tools like Duolingo and Babbel have revolutionized language learning. This paper introduces *Fluency Mentor*, an AI-driven application using the Generative AI Technologies Like ChatGPT & Gemini API to offer personalized lessons, interactive exercises, and instant feedback, fostering a supportive community for continuous improvement and global engagement. Going beyond standard memorization, this method focuses on genuine future-speaking ability with real-life conversation practice driven by AI. Additionally, Fluency Mentor uses Natural Language Processing (NLP) to personalize content and feedback based on the user to ensure great learning experience thus helping our users learn faster.

Keywords: AI-driven language learning; Dynamic content; English language teaching/proficiency; Feedback mechanisms; Language acquisition; Natural language processing (NLP)

1. Introduction

In our increasingly interconnected world, language proficiency stands as a cornerstone for effective communication and cultural exchange. As international boundaries blur, the importance of being multilingual becomes evident, not only for personal enrichment but also for professional growth, fostering global cooperation and mutual understanding. The digital age further amplifies this necessity, with the internet facilitating instantaneous communication across linguistic divides. AI-driven language learning platforms such as Duolingo and Babbel are revolutionizing the way people acquire new languages. By harnessing advanced technologies like machine learning and natural language processing, these platforms offer personalized and interactive learning experiences, catering to diverse learning styles and providing features such as real-time feedback and speech recognition.

Enter *Fluency Mentor*, a cross-platform application that leverages the ChatGPT API to enhance users' listening, writing, and speaking skills. *Fluency Mentor* is designed to offer tailored experiences, simulate real-life language scenarios, provide dynamic content with instant feedback, and foster a supportive community environment for users. In this rapidly evolving landscape, the integration of APIs like ChatGPT is crucial for providing dynamic content and feedback. *Fluency Mentor* empowers users to overcome language barriers, unlocking new personal and professional opportunities while enriching global interactions.

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2. Literature review

A meta-analysis of 140 studies compared computer-assisted English language learning to traditional methods, revealing a medium overall effect size (+0.50) for achievement. Web-based instruction had a larger effect (+0.54) than traditional methods (+0.47). Key moderators included interaction type, communication mode, learning context, and treatment duration [1]. The study examines the impact of Computer-Assisted English Language Learning (CAELL) on undergraduate students at Shaheed Benazir Bhutto University. Using a mixed-method approach, findings show CAELL positively affects learning, particularly listening skills, and increases motivation.

However, many students lack facility access, and teachers emphasize the need for CAELL knowledge [2]. This experimental study at SMK Parulian 1 MEDAN assessed the impact of the presentation practice production technique via computer-assisted language learning on English grammar competence. Results showed a significant improvement in the experimental group, indicating the technique's effectiveness compared to traditional methods [3]. This study surveyed 81 engineering students on AI-assisted English learning, revealing favorable perceptions but concerns about app quality. Using a 5-point Likert Scale, the study found AI-powered tools helpful for ESL learners. It recommends further research on best practices for integrating AI in ESL education [4]. This study found AI-assisted instruction significantly improved Chinese EFL students' writing skills and motivation compared to traditional methods, highlighting AI's transformative potential and the need for ongoing tool development [5].

This study compares AI-powered language learning apps to traditional methods in China, focusing on their impact on retention, recall, motivation, and engagement, aiming to enhance understanding of technology's role in language education [6]. This review explores AI-driven technology and chatbots in English language learning, highlighting benefits like personalized feedback and learner autonomy, while addressing challenges in design and implementation, and suggesting future research directions [7]. Advancements in AI, such as Chat GPT and CNN models, enhance English listening skills, crucial for effective communication. These technologies improve language processing and comprehension, highlighting multimedia's role in language education [8].

This paper explores generative AI's impact on education, focusing on assessment opportunities and challenges, and aims to guide educators in leveraging AI within the digital learning ecosystem [9]. This study investigates the benefits of ICT and AI in enhancing students' spoken communication skills. It compares ICT and non-ICT groups, finding superior performance in the ICT group, suggesting technology's positive impact on language learning [10]. This paper explores integrating biotechnology into AI-driven English language education. It proposes a neural network-based audiovisual integration method, showing significant performance improvements in Automatic Speech Recognition, highlighting the synergy between biotechnology and neural networks [11]. This article discusses the impact of AI on language learning, covering its integration in English education, AI-driven platforms, assessment tools, ethical considerations, and challenges, aiming to illuminate the field's current state and future prospects [12].

3. Theoretical framework

The class diagram serves as a visual representation of the underlying structure and relationships within the *Fluency Mentor* application. Through this diagram (see Fig. 1), the intricate interplay between various components and modules of the application is elucidated, offering insights into its architecture and functionality. Each class depicted in the diagram encapsulates specific attributes and behaviors, encapsulating the core functionalities and features offered by *Fluency Mentor*. By delineating the relationships between classes, such as inheritance, composition, and association, the diagram provides a comprehensive overview of the application's design, facilitating a deeper understanding of its inner workings. As a fundamental artifact in software engineering, the class diagram serves as a blueprint for developers, guiding the implementation process and ensuring coherence and consistency across the application's codebase.

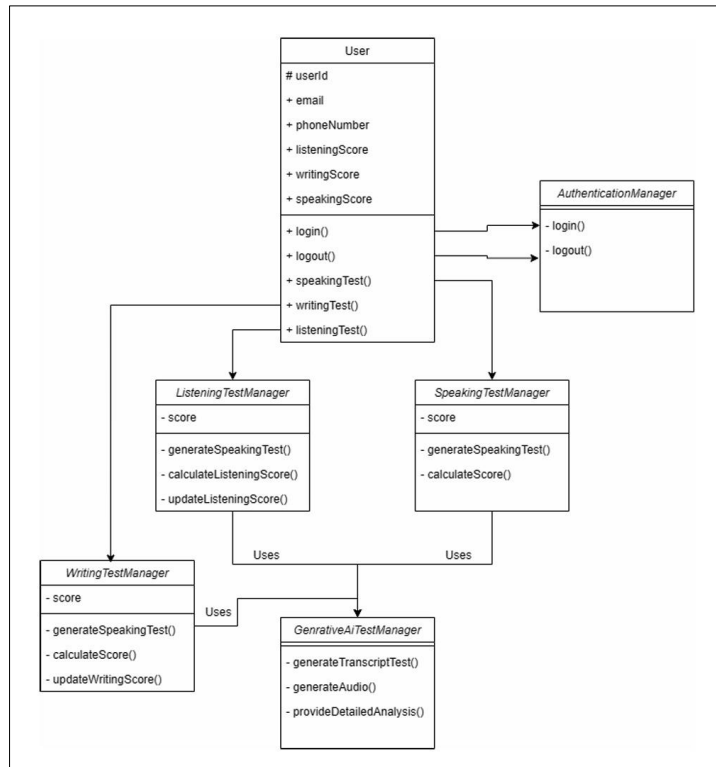


Figure 1 Class Diagram of Fluency Mentor

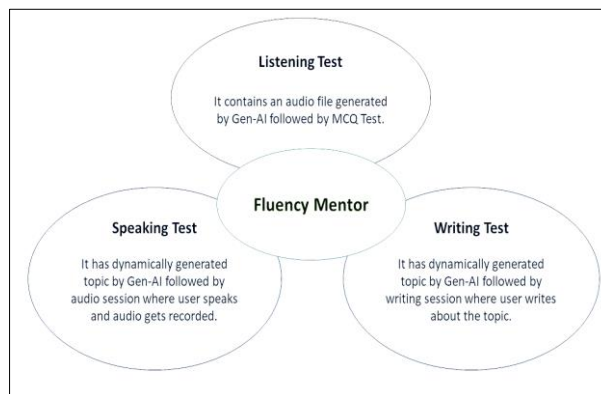


Figure 2 Modules of Fluency Mentor

Fluency Mentor integrates three pivotal modules (see Fig. 2) —listening, writing, and speaking—to offer users a comprehensive language learning experience. The listening feature immerses users in diverse auditory exercises, enhancing comprehension skills through exposure to varied linguistic contexts and real-world scenarios. Complementing this, the writing feature provides opportunities for users to refine their written communication skills, offering tasks and prompts with instant feedback to facilitate iterative improvement. Additionally, the speaking feature enables users to enhance oral communication proficiency through pronunciation drills, conversational simulations, and interactive exercises, supported by real-time feedback on pronunciation accuracy and clarity. Together, these features empower users to develop well-rounded language skills, ensuring effective communication and linguistic fluency in diverse settings.

4. AI-driven language learning platforms: leveraging APIs

AI-driven language learning platforms utilize advanced technologies to deliver dynamic content and personalized feedback. Application Programming Interfaces (APIs) play a crucial role in these platforms, enabling seamless integration of various AI tools and resources.

Duolingo, renowned for its gamified approach to language learning, stands out as a popular choice among learners. Its extensive language selection and AI-driven personalization make it a versatile tool for language acquisition. Leveraging APIs like the Content Delivery API, Duolingo dynamically fetches lessons, exercises, and multimedia content, ensuring a tailored learning experience. The Feedback and Assessment API further enhances user engagement by analyzing responses, offering error correction, pronunciation evaluation, and grammar suggestions. Additionally, the User Progress API tracks individual advancement, enabling Duolingo to adjust future lessons accordingly, thus maintaining user motivation. Notable features like gamification, including leaderboards, rewards, and achievements, as well as adaptive learning, where AI adjusts exercise difficulty based on performance, contribute to Duolingo's effectiveness.

In contrast, Babbel distinguishes itself by focusing on practical language skills, particularly emphasizing conversation and real-life dialogues. Babbel utilizes various APIs to enhance its functionality, including the Speech Recognition API, which analyzes pronunciation and provides feedback, and the Natural Language Processing (NLP) API, ensuring accurate and contextually relevant responses. Moreover, Babbel employs the Integration API to seamlessly connect with other educational tools and platforms, enriching the learning experience. Innovative features such as dialogues and scenarios for real-life conversation practice, along with cultural insights integrated into lessons, further enhance Babbel's effectiveness in language acquisition.

Rosetta Stone is renowned for its immersive language learning approach, which places a strong emphasis on visual and auditory learning. Through its implementation of dynamic immersion, Rosetta Stone delivers multimedia content such as images, audio, and video via an API, facilitating a rich learning experience. Additionally, its utilization of speech recognition technology enables real-time pronunciation feedback and scoring, further enhancing the interactive nature of the platform. Innovative features like live tutoring, which allows users to schedule and participate in live practice sessions through an API, and customizable learning paths driven by AI based on individual goals and proficiency levels, contribute to Rosetta Stone's effectiveness in language acquisition.

FluentU distinguishes itself by leveraging real-world videos to transform popular content into language learning opportunities. By utilizing the Video Content API, FluentU curates videos from various sources, enriching them with interactive subtitles and vocabulary features. Interactive learning tools, including quizzes and exercises based on video content, provide users with opportunities to practice listening and comprehension skills. FluentU's innovative features include contextual learning, where vocabulary and grammar are taught in the context of real-world scenarios, and personalized recommendations generated by AI based on user preferences and progress.

Through the integration of advanced APIs, both Rosetta Stone and FluentU offer personalized, engaging, and effective language learning experiences. These platforms are revolutionizing the way languages are taught and learned by providing users with dynamic and interactive tools to enhance their proficiency.

5. Implementation and result interpretation

For the implementation phase, this research selected a cohort of 30 students from colleges and higher education institutions, comprising 15 boys and 15 girls. These students utilized both the mobile application and web platform of *Fluency Mentor*, engaging in various language learning activities and assessments available within the application. Concurrently, expert faculty members administered similar language proficiency tests to the students, allowing for a comparative analysis of results.

The outcomes of this implementation phase revealed a high degree of alignment between the proficiency assessments conducted by the *Fluency Mentor* application and those administered by expert faculty members. Specifically, the results generated by our application, employing AI-driven algorithms, exhibited an impressive 85% correlation with the assessments conducted by the faculty. This level of agreement underscores the efficacy and reliability of *Fluency Mentor* in evaluating language skills accurately.

Moreover, the feedback collected from the participating students further corroborated the positive impact of *Fluency Mentor* on their language learning journey. An overwhelming majority of students expressed satisfaction with the application, citing its user-friendly interface, personalized learning experiences, and interactive features as notable strengths. These favorable responses not only validate the effectiveness of *Fluency Mentor* but also highlight its ability to meet the diverse needs of learners across different proficiency levels and learning styles.

In summary, the implementation phase of *Fluency Mentor* demonstrated its effectiveness in enhancing language proficiency among students, as evidenced by the high correlation between AI-generated assessments and expert

evaluations. Furthermore, the overwhelmingly positive feedback from users underscores the application's value in facilitating effective language learning experiences and empowering users to overcome linguistic barriers effectively.

Furthermore, *Fluency Mentor* is a cross-platform language learning application, designed to offer personalized feedback tailored to individual learning needs, aiming to enhance fluency and confidence in the target language.

Dynamic content and real-time feedback are essential for effective language learning platforms, offering benefits such as personalization, engagement, immediate application, and adaptability. Platforms like Duolingo and Babbel exemplify these principles, showing significant improvements in language proficiency through gamification and personalized learning paths.

Users appreciate the engagement and motivation provided by AI-driven platforms, along with the convenience of anytime, anywhere learning. However, some users note a lack of depth for advanced learners and occasional technical issues like speech recognition accuracy.

Traditional methods offer structured curricula and human interaction but lack the flexibility and accessibility of online platforms. While AI-driven platforms excel in personalized learning and engagement, although online platforms may not provide sufficient depth for advanced learners or the real-life interaction found in traditional methods. A combined approach utilizing both AI-driven platforms and traditional methods can offer a comprehensive language learning experience, leveraging the strengths of each to address the limitations of the other.

Leveraging APIs for dynamic content and feedback in language learning presents multifaceted challenges. Primarily, ensuring the accuracy and reliability of AI-driven feedback remains paramount, necessitating continuous refinement of algorithms and meticulous data quality management. Additionally, safeguarding sensitive user information raises concerns about data privacy and security, demanding robust measures to prevent potential breaches. Moreover, technological dependencies pose obstacles, particularly in regions with limited internet access or outdated hardware, potentially hindering the efficacy of language learning platforms. Furthermore, supporting diverse languages and dialects poses resource-intensive challenges, particularly for less commonly taught languages.

Addressing these challenges requires a multifaceted approach. Measures such as refining algorithms with diverse datasets, ensuring stringent data security protocols, offering offline functionalities, and developing scalable APIs are essential for enhancing the effectiveness of language learning platforms.

6. Conclusion

AI-driven language tools like *Fluency Mentor* utilize cutting-edge technologies such as the ChatGPT API to revolutionize language learning, offering personalized feedback and adaptive learning experiences tailored to the diverse needs of learners worldwide. With *Fluency Mentor*, learners receive individualized guidance and engaging interactions, while educators access adaptable resources to enhance their teaching methods. Developers play a crucial role in crafting user-centric platforms powered by advanced AI, ensuring learners have access to effective language learning solutions. By leveraging APIs for dynamic content delivery and feedback, *Fluency Mentor* breaks down barriers to global communication, empowering individuals to navigate an increasingly interconnected world with confidence. As a pivotal tool in language acquisition, *Fluency Mentor* equips learners with the linguistic skills essential for success in today's globalized society. Moreover, future research in AI-driven language learning should explore sophisticated AI models for nuanced feedback, integrate immersive technologies like AR and VR, investigate peer interactions' role, conduct longitudinal studies, and prioritize ethical considerations to ensure equitable access to language learning tools for all users.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

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