Using Artificial Intelligence in Teaching English and Enhancing Cultural Communication

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Abstract: This research attempts to investigate the role of artificial intelligence in boosting the process of English language instruction and facilitating cultural communication among individuals. Artificial intelligence serves as a potent instrument in the advancement of language teaching methodologies, particularly in the context of English language instruction. It offers innovative educational solutions that facilitate the attainment of more rapid and efficient outcomes in comparison to conventional approaches. The research addresses various AI tools and techniques such as interactive applications Duo lingo and Babble that help improve reading, writing, listening, and speaking skills, in addition to the use of natural language processing (NLP) software and voice assistant systems. It illustrates the application of virtual and augmented reality technology in developing simulated learning environments that facilitate successful learner engagement with educational content.

Keywords: artificial intelligence, intercultural communication, interactive applications, natural language processing software, English language

استخدام الذكاء الاصطناعي في تعليم اللغة الإنجليزية وتعزيز التواصل الثقافي

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ملخص البحث: يهدف هذا البحث إلى استكشاف دور الذكاء الاصطناعي في تحسين عملية تعليم اللغة الإنجليزية وتعزيز التواصل الثقافي بين الأفراد. يُعتبر الذكاء الاصطناعي أداة فعّالة تُسهم في تطوير طرق تدريس اللغات، خاصة اللغة الإنجليزية، من خلال تقديم حلول تعليمية مبتكرة تساعد على تحقيق نتائج أسرع وأكثر كفاءة مقارنة بالأساليب التقليدية. يتناول البحث الأدوات والتقنيات المتنوعة للذكاء الاصطناعي مثل التطبيقات التفاعلية (Duolingo   و Babble) التي تساعد في تحسين مهارات القراءة، الكتابة، الاستماع، والتحدث، بالإضافة إلى استخدام برمجيات معالجة اللغة الطبيعية (NLP) وأنظمة المساعدات الصوتية. كما يُلقي الضوء على استخدام تقنيات الواقع الافتراضي والمعزز في إنشاء بيئات تعليمية محاكيه تساعد المتعلمين على الانخراط الفعّال مع المحتوى التعليمي.

الكلمات المفتاحية : الذكاء الاصطناعي، التواصل الثقافي، التطبيقات التفاعلية، برامجيات معالجة اللغة الطبيعية، اللغة الإنجليزي

1. Introduction

Artificial intelligence is an effective tool that contributes to developing methods of teaching languages, especially English, by providing innovative solutions that help achieve faster and more efficient results compared to traditional techniques [1]. This research aims to explore the role of artificial intelligence in improving the process of teaching the English language and enhancing cultural communication between individuals. In [2] a study demonstrated how AI offered learning experiences that were personalized and adapted to the individual by integrating both cognitive and affective domains, as well as psychomotor domains. The result of this integration was an enhancement of both language acquisition and cultural communication. The impact of artificial intelligence (AI) on language education has been transformative, with the development of sophisticated and effective learning solutions. [3] Implementing ICT integration requires transforming teaching concepts, improving teaching strategies, and innovating teaching methods.

The advancement of AI-driven technologies has afforded language learners access to specialized and cognitive tools that customize courses according to their proficiency levels and individual learning styles [4]. These AI-driven systems have demonstrated efficacy in enhancing vocabulary and grammar acquisition, in addition to improving pronunciation. [5] Furthermore, AI plays a crucial role in facilitating linguistic and cultural exchange, thereby creating a dynamic and efficient language acquisition approach, particularly for Arabic and English language learners [6]. In recent years, there has been a notable increase in the importance of technology in education. Virtual learning environments, especially online platforms, have been recognized as providing innovative solutions to meet the evolving requirements of both students and educators. By utilizing online platforms, English as a Foreign Language (EFL) learners can surmount the constraints typically associated with traditional classroom settings, including limited class sizes, restricted lesson durations, and elevated student-to-teacher ratios. These virtual platforms promote participation in interactive speaking exercises, provide real-time feedback through mediation, and augment communication skills beyond the limitations of the traditional classroom setting [7][8].

2. Artificial intelligence tools and techniques in teaching English

- **Interactive applications**:Apps like Duolingo and Babble help improve to achieve the following; reading, writing, listening, and speaking skills [15]. Additionally, these apps provide a personalized learning experience that matches each student's proficiency level, interests, and learning style [9].

- **Natural Language Processing (NLP):** NLP software analyzes and understands written and spoken English, helping develop intelligent tools to correct linguistic errors and improve the quality of texts [10].

- **Voice assistant systems**: Systems such as Siri and Alexa are used to provide an interactive learning environment, where learners can interact with the voice system to improve English pronunciation and speaking skills [11].

- **Virtual and Augmented Reality:** Virtual and augmented reality technologies are used to create simulated learning environments that help learners effectively engage with educational content [12], which enhances the learning process and improves understanding of the English language [13].

3. Artificial intelligence and its Role in Enhancing Cultural Communication

Artificial intelligence is pivotal in enhancing cross-cultural communication by offering instantaneous translation services. Tools for simultaneous translation that utilize artificial intelligence significantly aid in facilitating interactions among individuals from diverse cultural backgrounds, thereby fostering comprehension of various languages and promoting the exchange of ideas and experiences. Artificial intelligence possesses the capability to analyses extensive datasets about various cultures, thereby facilitating a deeper comprehension of diverse customs, traditions, and values. This, in turn, enhances communication among individuals from disparate cultural backgrounds [15]. Facilitating comprehensive educational environments, in other words artificial intelligence has the capacity to create comprehensive educational environments that consider the diverse requirements of learners from various cultural backgrounds, thereby fostering improved communication and collaboration among them [16].

4. Methodology

The English language simulation program is a smart tool designed to help English learners improve their writing and speaking skills. It allows users to enter written or spoken English texts and then automatically analyzes them to detect and correct spelling and grammatical errors. After correcting the text, users can listen to it out loud to ensure the correct pronunciation of sentences and words. The program provides instant feedback to users, helping them learn from their mistakes and improve their language skills faster.

In addition, the program helps enhance writing skills by providing error-free texts and enhances pronunciation skills by allowing users to hear the correct pronunciation of sentences and words.

This program is easy to use and can be accessed anytime, anywhere, making it an ideal tool for English learners of all levels. **Figure 1** shows a virtual tool or window for correcting spelling errors. Its primary function is to detect and correct misspelled or typographical words in texts.

4.1 Detailed algorithm of the program

Input: Text entered by the user (either by typing or voice recording.(

Output: Text correction and display in the interface.

Algorithm steps:

1. Startup: Install and load the required libraries
- Install libraries (SpeechRecognition, pyspellchecker, language-tool-python, ipywidgets, gTTS).
- Import the required tools (speech_recognition, SpellChecker, language_tool_python, gTTS, ipywidgets.(
- Configure LanguageTool for grammar correction and SpellChecker for spelling correction.

2. Text input
- The user manually enters text in the ipywidgets interface or speaks the sentence using the microphone.
- If the input is audio, it is converted to text using speech_recognition.

3. Spell correction
- The entered text is analyzed word by word by SpellChecker.
- Replace incorrect words with the nearest suggested correction.

4. Grammar correction
- Pass the corrected text to language_tool_python.
- Find and correct grammar errors automatically.

5. Display the result
- The entire corrected text (spelling and grammar) appears in the ipywidgets interface.

6. Convert text to audio (optional(
- The user can click a button to convert the corrected text to an audio file using gTTS.

7. Listen to the entered text (optional)
- The user can record his voice using the microphone, then the program goes through the same previous steps (convert, correct, display, audio conversion).

8. End of the process
- The program displays the corrected text and allows playing the corrected audio if requested.

Figure 1: Spelling error correction window

Figure 2 represents a virtual tool or window for correcting linguistic errors, specifically grammatical and spelling errors.

Figure 2: Grammar error correction window

Figure 3 This tool is useful for people who need to verify the authenticity of their texts and convert them to speech.
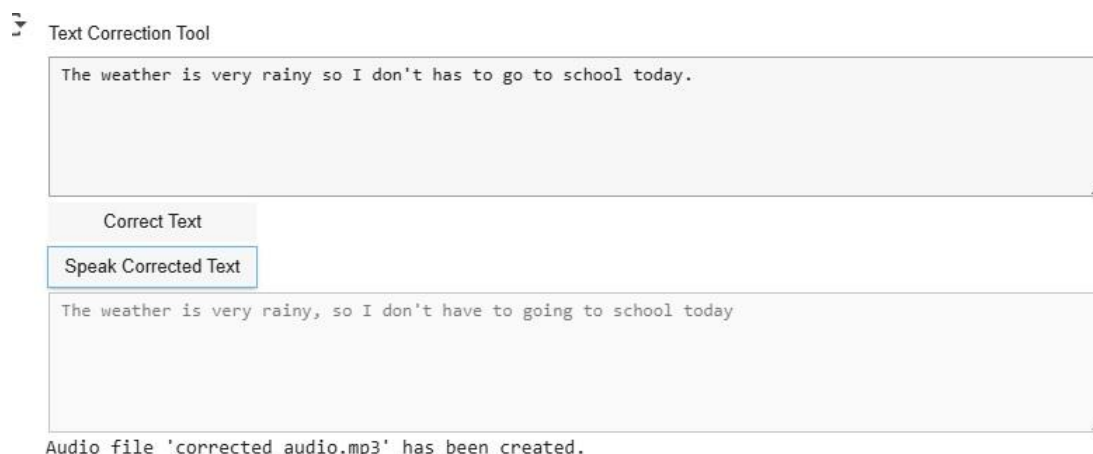
Figure 3: Record audio in mp3 format and save it in a file

Figure 4 A text-to-speech program with the part currently being processed highlighted. At the top, the Arabic text says "Processing audio file" (which means: "Processing audio file"), indicating that the program is converting text to audible speech. Below that, the English text says "connect primary 5 for Egypt term 1 by Paul Drury and Nicolas Gardner published by in copyright York press", with the last part highlighted ("York press"), indicating that it is the current part of the text being processed to convert it to speech. In general, the program takes the text and converts it to speech, showing the part currently being processed.
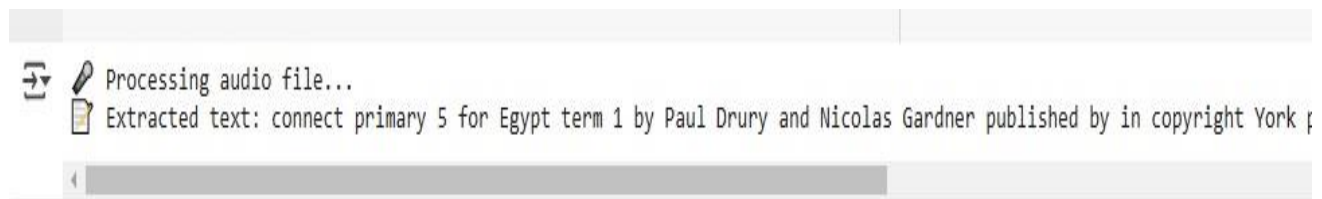

Figure 4: Recording audio and extracting text from audio

5. Results and Analysis

In this experiment, the English language correction program was tested on a set of sentences containing grammatical and syntactic errors, as well as other sentences containing spelling errors. The results are presented in the form of two tables, Table 1 shows the grammatical and syntactic errors that the program corrected, while Table 2 shows the spelling errors that were corrected by the program.

5.1 Table 1: Correction of Grammatical and Syntactic Errors
Table 1 contains English sentences written with grammatical and syntactic errors, which are errors related to the use of tenses, subject-verb agreement, verb conjugation, word order, use of adjectives and adverbs, and other basic rules of the English language. In the second column, the sentence is shown after the program has corrected it.

Table 1: Refers to correcting the original sentence grammatically.

ID	Original Sentence	Corrected Sentence	Error type	Error description	Relevant rule
1	He went to the market to buying some groceries.	He went to the market to buy some groceries.	Grammatical	Using a gerund instead of	The verb following "to" in an

				an infinitive.	infinitive structure should be in its base form.
2	The book wich I read was very interesting.	The book which I read was very interesting.	Spelling	Incorrect spelling of "which"	The correct spelling of relative pronouns should be used.
3	This story is more exciting than the another one.	This story is more exciting than the other one.	Grammatical	Incorrect use of " another" instead of " other".	"Another" is used for singular indefinite nouns, while "other" is used for definite references.
4	They was listening carefully to the teacher.	They were listening carefully to the teacher.	Grammatical	Subject-verb agreement error.	The verb "was" is singular. But "they" is plural, so should be used.
5	I can't not go to the party.	I can't go to the party.	Double negation	Using two negative words incorrectly in the same sentence.	In standard English, double negatives cancel each other out and should be avoided.
6	The children plays in the park.	The children play in the park.	Grammatical	Incorrect verb conjugation for a plural	Plural subjects take base-form verbs without an

				subject.	added "s".
7	The technology has maked big changes in society.	The technology has made big changes in society.	Spelling/ Grammar	Incorrect past participle form of "make".	Irregular verbs have specific past participle forms(e.g., " make" "made").→
8	This is the first time I see such a view.	This is the first time I have seen such a view.	Grammatical	Incorrect verb tense.	"the first time" usually requires the present perfect tense.
9	He sat on the chair and put his legs on the table.	He sat on the chair and put his feet on the table.	Vocabulary	Incorrect use of "legs" instead of "feet".	"Legs" refer to the entire limb, while "feet" refer to the lower part used for stepping.
10	He deserves to win because he is very hardworking, but he didn't get it.	He deserves to win because he is very hardworking, but he didn't win.	Ambiguity	"Get it" is unclear in meaning.	Use specific and direct verbs to ensure clarity in meaning.

From Table 1, it can be seen that the program corrected the grammatical and syntactic errors with high accuracy, as it was able to:

• The program successfully corrected grammatical and syntactic errors that English language learners commonly repeat.
• The corrections included subject-verb agreement, using correct tenses, and improving the formation of conditional sentences.
• The program can help users improve their ability to write sentences in a grammatically correct manner.

5.2 Table Two: Correcting Spelling Errors

Table 2 shows sentences that contain common spelling errors, such as misspelling some words because of similar sounds or using the wrong letters. In the second column, the sentence appears after the program corrected the spelling errors.

Table 2: Indicates the spelling correction of the original sentence.

ID	Original Sentence	Corrected Sentence	Error description
1	I recived your massege yesturday.	I received your message yesterday.	"recived" was corrected to "received", "massege" to "message", and "yesturday" to "yesterday". .
2	The techer gave us a difficult assignement.	The teacher gave us a difficult assignment.	"techer" was corrected to "teacher" and "assignement" to "assignment".
3	He finaly found the lost documnt.	He finally found the lost document.	"finaly" was corrected to "finally" and "documnt" to "document".
4	We are planing to go on vaccation.	We are planning to go on vacation.	"planing" should be "planning" and "vacation" should be "vacation".
5	She writted a beutiful story.	She wrote a beautiful story.	"writted" was corrected to "wrote" and "beutiful" to "beautiful".
6	The weater is very col today.	The weather is very cold today.	"weater" should be "weather" and "col" should be "cold".
7	I cant belive he did that!	I can't believe he did that!	"cant" should be "can't" and "belive" should be "believe".
8	This resaurant serves delicios food.	This restaurant serves delicious food.	"resaurant" should be "restaurant" and "delicios"

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عدد خاص لأبحاث المؤتمر العلمي الثاني الموسوم (الارتقاء بالأداء التربوي والتعليمي- رؤى وتطبيقات معاصرة) الذي تقيمه الكلية التربوية المفتوحة ونقابة المعلمين العراقيين بالتعاون مع كلية التربية للعلوم الانسانية – جامعة البصرة وكلية المأمون الجامعة تحت شعار (اسس التطوير وسبل التغيير) في 26-2-2025

			should be "delicious".
9	I will adress the issue tomorrow.	I will address the issue tomorrow.	"adress" should be "address".
10	She has alreedy completed her homework.	She has already completed her homework.	"alreedy" should be "already".

From the table 2, it can be seen:

- The program was able to correct many spelling errors that the user may make due to the similar pronunciation of some words.
- Among the errors that were corrected:
- Switching the order of letters such as "recived" to "received".
- Adding missing letters such as "belive" to "believe".
- Correcting common spellings such as "techer" to "teacher".
- The program provides a powerful tool for improving spelling in English.

Thus, the program proves its efficiency in improving the accuracy of texts written in English, making it a useful tool for students and professionals who need accurate linguistic proofreading.

5.3 Overall Conclusion

The above two tables (Table1 and Table 2) show that the language correction program was successful in dealing with and correcting grammar and grammatical errors effectively. It also provided accurate corrections for spelling errors, making it useful for people who write in English and want to improve the quality of their writing. This program can be of great benefit to students, researchers, and professionals who need accurate language checking while writing.

6. Objectives and Features

The study aims to help users to improve their English writing skills by identifying and correcting common mistakes.

- **Enhance pronunciation**: With the text-to-speech feature, users can listen to the correct pronunciation of words and sentences, improving their pronunciation skills.

- **Provide instant feedback**: The code provides instant corrections for errors, helping users learn faster.

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- **Ease of use**: The user interface is simple and easy to use, even for beginners.

- **Voice input support:** This feature allows text to be entered by voice, making it suitable for learners who prefer speaking.

7. Challenges

The following challenges appear in using the apps in this study these include; firstly, voice recognition accuracy may not always be perfect, especially in noisy environments or with different accents. Secondly, in terms of language complexity, English is complex, and the code may struggle to handle some complex language structures or specialized terminology. Moreover, Google Colab limitations: Some features, such as microphone access, may require some special settings in Google Colab. However, there are possible solutions for the challenging features. For example, the support for additional languages. The code can be expanded to support other languages. Integration with educational tools, it can be integrated with other educational applications or platforms. Deeper error analysis, which suggests detailed information, can be provided about the types of errors made by the user. Finally, interactive exercises can be added to help users practice grammar and vocabulary.

8. Boosting English language learning and Promoting Cultural Communication

This code serves as a significant asset for learners across all proficiency levels, facilitating the enhancement of their language abilities through an interactive and tailored approach. Furthermore, this code serves to enhance effective communication among individuals from diverse cultural backgrounds by refining both writing and speaking competencies. In other words, it aids in the comprehension of English texts, thereby facilitating the acquisition of knowledge and information from a variety of sources.

9. Conclusion

Artificial intelligence is one of the most prominent modern tools that have brought about a qualitative shift in English language learning methods, as it provides a dynamic learning environment that is interactive and adaptable to the different needs of learners. Through machine learning and natural language processing applications, learners can now improve their reading, writing, listening, and speaking skills through intelligent systems that simulate human interaction, such as voice assistants, instant translation applications, and e-learning platforms supported by artificial intelligence.

In addition, artificial intelligence contributes to the development of teaching methods by analyzing learners' performance and providing immediate feedback that helps correct linguistic errors and enhance linguistic understanding. It also provides greater opportunities for language learning in unconventional

environments, such as using virtual reality and augmented reality technologies to simulate real-life situations, which enhances the learner's ability to integrate linguistically and communicate confidently.

In light of these developments, artificial intelligence has become not just an aid, but an effective partner in the English language learning journey, as it contributes to removing linguistic and cultural barriers, and provides a more personalized learning experience that suits learners' different levels and goals. Therefore, investing in the development of artificial intelligence technologies in the field of language education represents an important step towards a more innovative and efficient educational future, contributing to building societies that are more connected and open to global cultures.

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