Specialized Generative Artificial Intelligence Application Program Design to Assist Language Education

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Abstract. Owing to the surge of ChatGPT and similar GenAI tools into all walks of human society, GenAI has definitely become the focal point and attracted great attention from academia. Based on the recent studies on GenAI, scholars and researchers have reached agreement that GenAI models have super power to generate logical responses and offer relevant information, which would bring huge implications on education, especially language education. This article analyzes the essays published after the launch of ChatGPT to summarize the benefits and potential risks brought by GenAI to language education. Focusing on the potential risks and problems caused by GenAI models in language learning scenarios, this article designs a GenAI application program based on existed Large Language Models, which specializes in assisting language user with learning in listening, speaking, reading, writing and translation. It will to some extent limit the negative effects of GenAI technology on language learning, help improve language learning effect and cultivate users' capacity of harnessing GenAI technology.

Keywords: GenAI, ChatGPT, language education, potential risks

1   Introduction

Since the official launch of ChatGPT in November, 2022, it has caused great attention in the whole world. The number of its registered users accumulated to more than 123 million within just 3 months. Compared with primary conversational chatbot, this generative AI model makes a great breakthrough in algorithms, data analysis, training methods as well as the optimization techniques, capable of generating coherent context-aware text. While its producer, the American company OpenAI released the updated version ChatGPT 4.0 in March, 2023, improving on the previous in advancing AI architectures and training methods. It has the capability to translate language, summarize texts, answer questions, write poems, stories, or movie scripts, write articles, blog posts, or emails, respond to prompts in conversations, explain complex topics or concepts, fix errors in existing codes or generate new codes, and describe images in detail [1].

It is undeniable that ChatGPT, as a text GenAI model, has become the focal point of human society, fast leading to the catch-up of tech companies on developing their own

Generative AI models. Until now, there are many similar text Generative AI models seen as the alternatives to ChatGPT, some of which are in high popularity (see in Table 1).

Table 1. Popular GenAI models in the market

Text GenAI model	Producer	Country
ChatGPT-4	OpenAI	USA
Bard	Google	USA
NewBing	Microsoft	USA
Ernie (Wenxin Yiyan)	Baidu	China
Tongyi Qianwen	Alibaba	China
Hunyuan	Tencent	China

Generally speaking, they all have outstanding capabilities in text-based content generation and contextual understanding under given prompts. With these functions of text generation, question answering, language translation, grammar correction, creative writing, content summarization, text GenAI models empower human beings on language use in different situations with high quality and efficiency. While, such powerful language tools have huge implications on educational realm. The famous linguist Noam Chomsky considers that ChatGPT is basically High-Tech plagiarism and a way of avoiding learning. Many educators concern the increasing interpersonal disorder among students, ghostwriting and cheating, challenge on teachers' evaluation as well as professional dignity.

Seeing that ChatGPT has brought overwhelming changes on living, learning and working of human beings, refusal on those similar powerful tools is impossible and also not a wise way to encounter the challenges. Scholars in the world have been engaging in researches with Gen AI models, especially with the representative ChatGPT in different aspects. As GenAI causes great shock waves to educational realm, many researchers are seeking to find a new way of teaching and learning with support by GenAI models in a rebuilt balanced eco educational system. Considering the empowerment of text GenAI models, this article aims to analyze the implications and risks brought by on language teaching and learning, and explore a way to limit the risks and maximize the positive functions of GenAI models to serve language education. Therefore, a primary model of Gen AI English learning application program is attempted to be designed.

2   Literature Review

2.1   Researches on Gen AI

According to the Guidance of generative AI in education and research made by UNESCO (2023) [8], Generative AI (GenAI) is an artificial intelligence technology that automatically generates content in response to prompts written in natural-language conversational interfaces. After the launch of ChatGPT by OpenAI, it quickly garnered global attention. Trained on a diverse range of online text data, including news articles,

books, and websites, ChatGPT can respond to various types of prompts, such as questions, statements, and requests for information [3]. Its popularity can be seen as a representative reflection of the fact that GenAI products have sparked people's widespread interest in generative artificial intelligence technology [7].

When searching on the database Web of Science with the keyword "AIGC" or "generative artificial intelligence" or "ChatGPT", there are 7951 articles published from 2022 Jan. to 2024 April, involving in the fields of computer science, education, engineering, health care and medicine, mathematics, psychology, etc. (see Fig. 1).
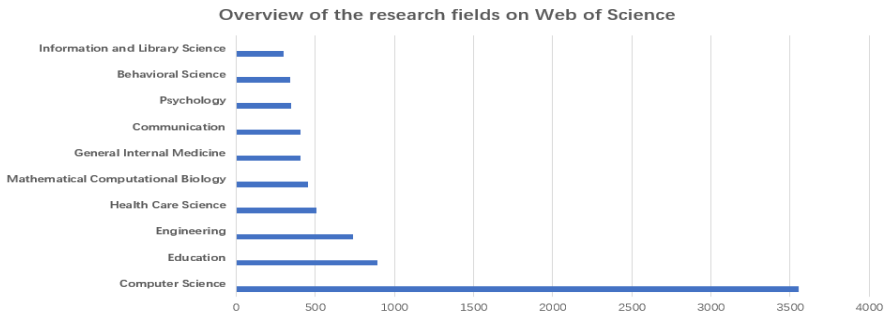

Fig. 1. Overview of the research fields on Wed of Science

It is obvious that GenAI has made a significant and overturning influence on different fields. While among those articles, the researches on Computer Science have possessed a great amount with 3553 articles which proves recent studies mainly focus on the evaluation of GenAI technology's performance, finding potential direction to make further adjustment and update on algorithm and natural language processing. Comparing to other fields, there are 891 articles related with education, ranking the second highest top in Fig.1. Since 2022, educational realm has been highly concerning the huge changes and challenges brought by GenAI to both teaching and learning activities. In the following part, relevant researches in educational application will be discussed in details.

2.2   Researches on GenAI in Educational Application

GenAI, like any object, is seen as a double sword. With the free access and fast response of these GenAI tools, such as ChatGPT, the original mode, routine and eco-balance of teaching and learning activities have been broken and need further reburnishing. Many researchers have been engaging into the researches about the implications brought by GenAI in educational application. Based on the recent studies on GenAI in educational application, the implications are mainly involved in two sides, the convenience and benefit of GenAI serving teaching and learning activities, and the limits and risks caused by GenAI technology used in teaching and learning activities.

Implications of GenAI in Educational Application

Many researches demonstrate that GenAI empowers teachers' working efficiency with diversified teaching designs and could assist teachers to fast make assessment on learners' assignments. It can be seen as a valuable supplement and enhancement to traditional language teaching methods [6]. On the other hand, it provides students a new approach to facilitate complex learning as well as information accessibility. In the case of ChatGPT, it can offer language input, instant feedback and formative assessments with certain prompts [4]. It starts a novel and interesting way of language learning by mimicking human conversation and interaction [5].

However, the initial concern in education was that ChatGPT and similar GenAI tools would be used by students to cheat on their assignments, thus undermining the value of learning assessment, certification and qualifications [2]. Students who have no access to GenAI tools finish assignment by themselves may have lower scores compared with those who cheat by using GenAI tools, which will cause educational injustice and unfairness. Long-time use of GenAI tools may lead to emotional problem when face-to-face communicate with each other. Besides, abuse of ChatGPT and other GenAI tools will also cause academic misconduct and integrity issues. A more dangerous problem caused by GenAI tools is that these intelligent models may produce unintelligent or unethical responses, even the generative contents involved in violence, prejudice, discrimination. But if students had no capacity to distinguish those unintelligent contents and regard the wrong as the right, that would lead to mislearning on knowledge, culture and values.

Implications of GenAI in Language Education

Based on the above analysis, the benefits and potential risks brought by GenAI tools also fit into the subjects of language learning and teaching. As generative artificial intelligence model has substantial language materials, Chinese or English, it will set off shock waves when used into solving the problems in language teaching and learning. Relevant researches have already been made. According to Adiguzel [1], GenAI tools, like ChatGPT, definitely bring unexpected challenges as well as new development in language education. The implications are shown in the following table 2.

Table 2. Implications of GenAI on Language Education

Teacher	Compli-ments	Offer diversified teaching plans.
		Provide proper teaching materials.
		Help make Word, PowerPoint and other relevant teaching files.
		Design test based on certain language material.
		Help homework correction and offer feedback and explanation.
		Offer statistical analysis on student performance.
	Potential risks	Limit the improvement of teaching capacity.
		Have risk in mechanically teaching plagiarism.
		Bring challenge and threat to teachers' identity and status.
Student	Compli-ments	Offer instant response & learning materials based on learner's need.
		Provide analysis or solutions to learning problem.

		Offer writing samples within certain title or topics as well as translation to certain contextual material
		Serve as a chatbot to assist oral language and listening practice.
		Offer virtual companionship to relieve loneliness.
	Potential risks	Weaken students' learning motivation and consciousness.
		Restrain the development of critical thinking ability as well as innovation capacity.
		Cause ghostwriting and cheat on assignment.
		Affect interpersonal relationship and impair social competence.

3   Specialized AI Application Designed to Assist Language Learning

As the potential risks have been reflected in relevant studies on GenAI, it is undoubtable that educational realm, especially language education, encounter unprecedented challenges. While, based on the analysis in table 2, potential risks on language learners seems cause a much longer and much bigger impact on learners themselves as well as their learning effect. In order to rise to the series of limits and risks summarized above on language learners, this article engages in designing a specialized GenAI model which targets those potential risks, aiming to maximize the advantage of GenAI technology when assisting language learning. The original intention of this design is to limit the negative influence caused by GenAI technology as much as possible, offer effective support to help learning second language in listening, speaking, reading, writing and translation, and cultivate the learners' capacity of critical thinking as well as the ability of dealing with problems by harnessing GenAI tools. The following is the design of GenAI Model specialized in serving language learning (see Fig.2).
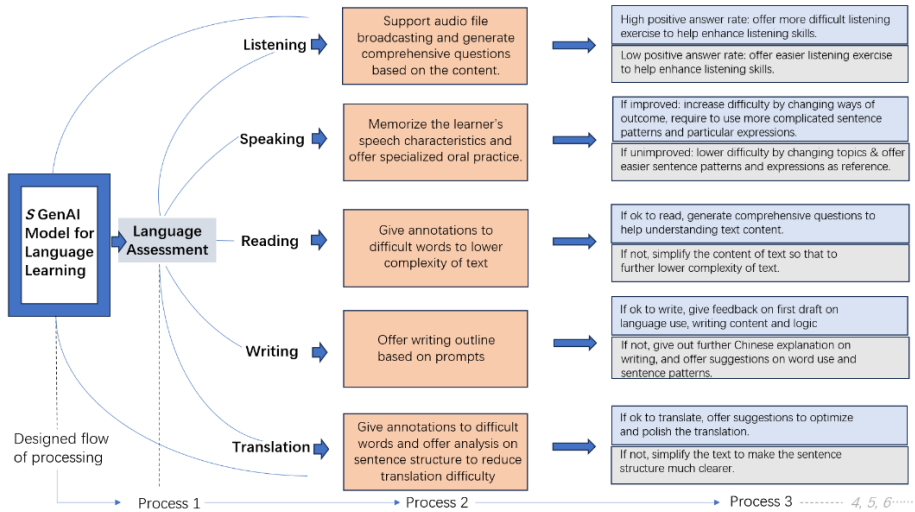

Fig. 2. Operation mechanism of Specialized GenAI Model for language learning

This application program is designed based on GenAI technology supported with large language models. With the designing concept of limiting the possible risks caused by GenAI technology on language learning, the first step of this program is to make a general assessment of learner's language level, testing personal language learning level and recording user's biological features, such as pronunciation and intonation. That will offer statistical foundation for later contextual and oral output. Then the main part of this program is set with real-time feedback mechanism (see the sample code below), which is applied into the five units, listening, speaking, reading, writing and translation.

```
def provide_language_materials(student_perfor-
mance,low_threshold):
if student_performance['correct_rate'] < low_threshold:
materials = lower_language_materials_generator()
else:
materials = enhance_language_materials_generator()
return materials
```

Therefore, in the following, the five units of this program, listening, speaking, reading, writing and translation will be explained about its general operational mechanism one by one.

- Listening

In order to help improve user's listening skills, this model is designed in the first stage to set a command with offering the service of broadcasting audio file, but no further translation English version into Chinese as well as generating text file, which to some extent forces user to process information in English mode of thinking. Besides, relative questions are also designed to help user further practice. In the second stage, if the user made a good performance, more difficult listening exercise would be offered to help strengthen his/her listening skills. If the user didn't perform well in this stage, the model would automatically simplify the original listening material by replacing difficult words and expressions and then generate an easier listening audio file to help user understand the content, assisting user in listening practice and cultivating his/her learning confidence.

- Speaking

In this part, based on the former general assessment of user's language level, this model would serve as an oral practicing partner and also offer oral samples based on certain communication scenario for learning use. As the biological features are recorded, the oral audio files generated are set with quite different pronunciation and intonation to prevent possible cheating. For example, in the first stage, this model would accompany user to make oral dialogue with proper difficulty level or generate oral sample based on user's prompt which further need user read and recite repeatedly under the preset supervision of this program. In the second stage, if the user performed very well when practicing, the program will increase difficulty by offering harder communication scenario as well as requisition on using more complicated sentence patterns and word expressions. While if didn't, easier topic would be picked out to help user further practice. This whole process of oral practicing will be recorded as documentary file.

- Reading

Based on previous experience, students are likely to cheat on reading comprehension with the powerful translating function of GenAI tools. Therefore, in this part, this model is designed and preset to offer annotations to difficult words and expressions based on user's language level instead of directly translating contextual materials. When user inputs a passage, with support of super large language model, this program quickly marks those words and expressions which are out of range of difficulty and offers relevant annotations to lower difficulty of text comprehension. And then, if user could easily to read and understand, some comprehensive questions would be offered to assist improving reading skills. While if still have problem on understanding the passage, this program would further simplify the content by substitute difficult words and sentence patterns so that users could handle it.

- Writing

Deeply rooted in Generative Pre-training Transformer architecture, ChatGPT and other similar GenAI models have strong capability for understanding and producing human-like texts as well as providing feedback on long texts [9][10], which provides possibilities to language learners' behaviors of ghostwriting and cheating. In this part, different with ChatGPT and similar GenAI tools, this specialized model is preset to provide writing outline with explanation based on user's prompt instead of a ready-made article for use. In this way, the ghostwriting rate would be greatly decreased. In the first stage, an outline is generated with detailed writing steps and suggestions, examples which can be used as evidences in writing. And next, if user wrote out the first draft of writing, this program would offer revision advices from the perspectives of language use, content, logic of writing, helping optimize draft writing and improving writing ability. But if user still cannot write anything out based on given outline, this program would give out more detailed explanations with writing samples which are designed into a kind of writing exercises, like filling in blanks with first sentence in each paragraph, or sequence those sentences to form a whole paragraph, etc. The content in given samples will be traced in users' submitted writing work in case of plagiarizing.

- Translation

Translation is the most affected part in language education since GenAI tools were easily accessible to the public. Based on research made by Chinese scholar Yang and Wang, the perceived ease of use showed a significant and positive impact on students use machine translation [11]. ChatGPT and other GenAI tools offer the ease for use to freely get high-qualified translation. That leads to Cheating on translation assignment very common in language learning which greatly affect students' learning effectiveness and foment unhealthy learning style. With the intention of improving user's translation skills, in the first stage this program is designed to offer annotation to difficult expressions as well as analysis on sentence structure to help user practice translation skills and gradually improve translation capacity. And then if the user could translate well with the given tips, the program would offer suggestions to revise and refine user's work. If not, this program would further simplify the translation material and provide relevant expressions to help finish translation.

The five parts of this program work with the same rule. That is to limit the potential risks brought by GenAI technology, serve user's real need of language learning, help improve user's learning effect and cultivate user's capacity of harnessing GenAI tools. While the five parts also work within the same mechanism (see Fig.3). That is to generate certain content, including learning exercise, suggestions, diversified learning materials based on user's prompt. If user could perform well with the generative content, this program would automatically generate harder one to improve certain learning skills. If not, easier contents and further learning advices would be given to help user reach learning goals.
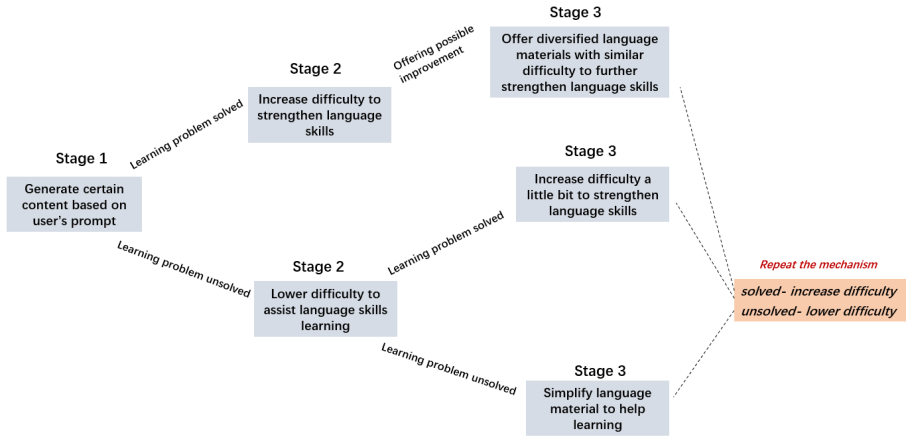
Stage 3
Offer diversified language materials with similar difficulty to further strengthen language skills

Offering possible improvement

Stage 2
Increase difficulty to strengthen language skills

Learning problem solved

Stage 1
Generate certain content based on user's prompt

Stage 3
Increase difficulty a little bit to strengthen language skills

Learning problem solved

Learning problem unsolved

Stage 2
Lower difficulty to assist language skills learning

Repeat the mechanism

solved- increase difficulty
unsolved- lower difficulty

Learning problem unsolved

Stage 3
Simplify language material to help learning

Fig. 3. Operating mechanism of the designed GenAI Application Program

4   Conclusion

Even though GenAI models, such as ChatGPT would exist some technical limits and cause potential risks in educational realm, prohibition on using them is not a wise way to solve problem. The best way is to learn it, embrace it and harness it. This article focuses on the potential risks probably existing in language education and designs a GenAI application specializing in helping language learning. While this GenAI application program is in the phase of designing, there are still many modules need further to be built. Specific operating process also need continue to be tested and revised. In addition, the program for the moment only focuses on the development of assisting language learning. Later the modules for assisting language teaching would be designed and developed. While theoretically this attempt could to some extent limit the risks of GenAI technology brought to language education and provide effective learning support to language learners based on its operation mechanism. Meanwhile, it also intends to bring attention to the integrative development of language education with GenAI technology and appeals to more tech companies to develop professional, well-targeted and user-friendly GenAI tools to assist future language education.

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