The Utilization of Artificial Intelligence at the Kwansei Gakuin University Language Center: Instructor Suggestions for Enhancing Teaching and Learning

Thomas STRINGER
Leon TOWNSEND-NAKAI
Craig GAMBLE
Michael WILKINS

Artificial intelligence (AI) is developing rapidly and affecting how education is co-constructed by teachers and learners. There has been an explosion of exploratory research in the past 5 years as new AI tools such as ChatGPT (OpenAI, 2023) have been made available to the wider public. The Japanese government is also very interested in incorporating these tools into different sectors. Similarly, as an educational institution, Kwansei Gakuin University (KGU) is being influenced by developments in AI technology. Instructors at the KGU Language Center (LC) are experimenting with how to leverage the affordances of AI to best support language teaching and learning. In this paper, suggestions and guidance are given for how to use AI in specific content, testing, and remedial courses offered by the LC, as well as for future research. The suggestions may not only be useful for LC teaching staff, but also transferable to other contexts.

"A robot must obey orders given to it by human beings," Isaac Asimov from *I, Robot.* (Asimov, 1950)

1. INTRODUCTION

While recent explosive developments in artificial intelligence (AI) and its near future uses are the subject of discussion and debate in many sectors, the applications of AI in the field of education are currently undergoing particularly widespread examination (Bond et al., 2024). Against this backdrop of rapid change, this research paper will look specifically at AI's potential to impact language learning and teaching in the context of the Kwansei Gakuin University (KGU) Language Center (LC) and the teaching staff's exploratory efforts to use AI to enhance their own teaching and students' language learning.

2. LITERATURE REVIEW

2.1 Artificial Intelligence

The term AI refers to systems that think and act rationally or like humans (Bringsjord & Sundar Govindarajulu, 2022), meaning learning, adapting, and making reasoned choices, or that can "perform tasks normally requiring human intelligence, such as visual perception, speech recognition, decision-making, and translation between languages" (Oxford Reference, 2023). Alongside developments like the increased availability of mobile internet, cloud computing, and mining of big data (Kabudi et al., 2021), there have been concurrent advancements in neural networks that mimic the layered structure and abstractive functions of the brain and that use algorithms to engage in bottom-up informational pattern recognition known as deep learning (Mariel et al., 2018). This advanced form of machine learning by neural networks occurs via training them on large sets of textual, auditory, speech, videographic, or image data. Accordingly, the capacity for AI to engage in processing, recognition, and generation of natural language has been greatly enhanced (Bender et al., 2021), and the barriers to entry for non-experts to use AI technology have begun to fall away (Pack & Maloney, 2023).

2.2 AI Applications in Education

Recently, research interest in AI applications in education has also exploded (Liang et al., 2023) in areas such as chatbots (Adamopoulou & Moussiades, 2020; Chen et al., 2023; Hwang & Chang, 2023; Kuhail et al., 2023; Rudolph et al., 2023), virtual or (VR) augmented reality (AR) (Hwang & Chien, 2022; Laine et al., 2022), automated feedback (Cavalcanti et al., 2021), evaluation (Huawei & Aryadoust, 2023), and speech recognition (ASR) (Alharbi et al., 2021), as well as computerized dynamic assessment (CDA) (Jeon, 2023), machine translation (MT) (Lee, 2023), adaptive or intelligent tutoring systems (ITS) (Feng et al., 2021; Kabudi et al., 2021;

Mousavinasab et al., 2021; Rokhman & Kobar, 2022), and for enhancing learner engagement (Foroughi et al., 2023). However, while there is undeniably a lot of excitement about the potential of the use of AI in education, there is an increasing realization that there are also many problematic issues arising from the general use of AI. There is growing scholarly recognition of a lack of fairness and equal representation (Memarian & Doleck, 2023), environmental costs (Bender et al., 2021), enhanced capacity for academic misconduct (Cotton et al., 2023; Farrokhnia et al., 2023; Renzella et al., 2022), and the generation of plausible sounding but false information, known as *hallucinations* (Pack & Maloney, 2023) resulting from this growth in AI.

2.3 AI Applications in Language Teaching and Learning

One field within education which has seen particular interest in the application of AI is language education (Liang et al., 2023; Son et al., 2023). As for language teaching, natural language processing (NLP) and ASR technologies have been used to supplement instruction in conversational skills (Timpe-Laughlin et al., 2022) and oral production (Bibauw et al., 2019) as well as for teaching writing (Marzuki et al., 2023). For example, in the teaching of English as a Foreign Language (EFL) writing, generative AI has been used to systematically produce lists of topics, genres, sample texts, writing prompts, stylistic rewrites, feature and error analyses (Stringer & Eberly, 2023). Furthermore, the ability of generative AI to function as a research assistant (Pack & Maloney, 2023) suggests a potential application in English for Academic Purposes (EAP) or English as a Medium of Instruction (EMI) academic skills courses (i.e. Kuznetcova, 2023). Second, another area in which language teaching is being impacted by AI is assessment. AI has the potential to enhance CDA of language skills in second or foreign language vocabulary (Jeon, 2023), grammar (Randall & Urbanski, 2023), reading (Hidri & Pileh Roud, 2020), writing (Hockly, 2019), pronunciation (Microsoft, 2023), and listening (O'Grady, 2023). Third, different models of human teacher / AI collaborator have also been explored. For instance, social robots have been used as teaching assistants (Lee & Lee, 2022), or even to replace human teachers as personal language tutors (De Wit et al., 2018), although it seems unlikely that human teachers will widely be replaced. For example, one common application of AI in language instruction are chatbots (Kohnke et al., 2023; Lee et al., 2020) such as ChatGPT (OpenAI, 2023). Research has demonstrated the essential role of the language teacher in enhancing student motivation (Chiu et al., 2023) and autonomy (Stringer, 2023) through facilitating honest and open discussions about best-practices (Kuznetcova, 2023) and troubleshooting learners' problems (Ji et al., 2023) when using such technologies.

As for language learning, systems that apply NLP have long been used as writing assistants, to heighten grammatical awareness (Dodigovic, 2003; 2007), and for grammar correction (Li et al., 2022). In addition, AI chatbots (Belda-Medina & Calvo-Ferrer, 2022; Fryer et al., 2020; Huang et al., 2022) and intelligent personal assistants (Moussalli & Cardoso, 2020) which are built on large language models (LLM) have been shown to help language learners with communicative skills due to their ability to sustain conversation. For instance, Xu et al. (2021) found that learners who read books with conversation agents such as smart speakers demonstrated enhanced intelligibility in response to questioning, although those who read with humans demonstrated greater lexical diversity. Furthermore, ASR-enabled chatbots have promoted linguistic competence in speaking and listening (Lee & Hwang, 2022), enhanced pronunciation in some cases (Sholekhah & Fakhrurriana, 2023) but not in others (Kim et al., 2021), and had positive affective impacts resulting from allowing learning at one's own pace (Jeon, 2022). Additional benefits include lowering language performance anxiety (Annamalai et al., 2023; Tai & Chen, 2023), promoting autonomous beyond-class learning (Liu & Ma, 2023) and self-regulatory goal-setting behavior (Hew et al., 2023), and providing additional support for low-ability learners or those from disadvantaged backgrounds (Um et al., 2023), although other studies showed no motivational benefits when compared against human interlocutors (Fryer et al., 2017). Future developments are likely to include more multisensory interactions, that is, those predicated on a greater variety of forms of input and output (Divekar et al., 2022).

2.4 AI Applications in Education in Japan

In Japan, the government has focused on AI as a crucial tool for social change. The *Society 5.0* (Cabinet Office, 2016) vision put AI center stage in transitioning from the information age (Society 4.0) to a more interconnected society of tomorrow. Various educational reforms are proposed, including reskilling the workforce in the face of domestic demographic challenges and changing styles of work due to AI-related pressures and international competition. In Society 5.0, a renewed focus on Science, Technology, Engineering, and Mathematics (STEM) subjects and more integration with humanities education, greater collaboration between different levels of education and industry, and the development of individualized or personalized learning plans and methods both inside and outside of formal learning contexts through the application of big data and EdTech are also recommended (MEXT, 2018a; 2018b). More detailed plans are being devised for curriculum reform, changes to teacher licensing and placement systems, revision of assessment methodologies to include more critical thinking skills, lessening urban/rural divide through more equally distributed collaborations with industry,

and more centralized management and application of analysis of learner data (CSTI, 2022).

Scholarship in Japan investigating the role of AI in English education in this more interconnected and globalized *Society 5.0* future has pointed to the need for more English-medium instruction (EMI), plurilingual and pluricultural competency development, and greater digital literacy (Kobayashi, 2022), and the use of AI for providing writing assistance (Gayed et al., 2022). To further investigate the current trends in Japan, an abstract screening was conducted on December 5th, 2023, of the *Technology* section of the program handbook for the Japan Association for Language Teaching (JALT) 2023 national conference. The screening revealed many thematic similarities to global trends in AI for language teaching and learning. This included AI for EMI, the role of LLM-enabled chatbots and MT in the teaching of writing, prompt engineering, and the use of ASR for teaching speaking and pronunciation. Other themes were AR and VR in the classroom and for assessment, AI-enabled plagiarism avoidance materials creation, and AI-enhanced support for students (JALT, 2023). In addition, a search was conducted on a Japanese research database (CiNii, 2023) on December 4th, 2023, for awarded grants, known as *kakenhi*, for publicly funded research on AI and English language education in Japan that were active in 2023. The following search string was used and returned 24 results, which can be seen in Appendix A ('AI' AND '教育' [kyoiku] AND '英語' [eigo]). Title screening of approved *kakenhi* projects revealed public funding had been allocated for research studies on human/AI writing collaboration, the future of language education and MT, investigations of AI in primary and secondary language education, individualized, localized, or VR learning or assessment materials development, AI automated speaking/ writing/ reading tools and chatbot development.

A review of the literature has revealed the extent of the broad changes occurring both globally and domestically in education as a result of AI, and more specifically in the fields of language teaching and learning. Furthermore, the level of government support, practitioner, and research interest in AI applications in the field in Japan was also demonstrated. Considering the Japanese government's interest in exploring the integration of AI into education at all levels, including higher education, it is important to now consider how these technologies and capabilities could be applied to language teaching and learning in local contexts.

3. RESEARCH CONTEXT
3.1 Institutional Context

Since 2019, Kwansei Gakuin University (KGU), a private university in Japan, has offered a unique AI course AI 活用人材育成プログラム [*AI katsuyō jinzai ikusei puroguramu*] or *AI Talent Development Program* (Kwansei Gakuin

University, 2021). The program, developed collaboratively with IBM Japan, trains students to use AI to address actual societal and business challenges, involves AI researchers and specialists, and includes opportunities for practice using AI for students across faculties (Kwansei Gakuin University, 2023). The program demonstrates KGU's commitment to promoting the use of AI in education. Furthermore, KGU has a long history of English language teaching, learner proficiency development, and fostering cross-cultural understanding. This is evident in the range of English language undergraduate and graduate degree programs it offers, partnerships with international universities, and the hosting of international students (Kwansei Gakuin University, 2020). Since 1992, another key arm of language education at KGU has been the Language Center (LC), which aims to further teaching, learning, and research across a range of languages (Language Center, 2023). As for English, the LC offers intensive language programs, electives, testing courses, and multidisciplinary skills (MS) courses for undergraduate students across the university (Language Center, 2019), some examples of which can be seen in Table 1.

TABLE 1

A table comparing courses offered by the KGU LC to which the application of AI could be explored

Type	Title	Credits	Aims	Schedule	Language of Instruction
Content	MS: Culture and Society	1	Understand target content area.	1 x week	English
Testing	SBE: TOEIC	1	Understand and practice the TOEIC Test	1 x week	English
Remedial	SBE: Basic	1	Low-level 4-skills English practice	1 x week	English
Remedial	Introductory English	1	Low-level 4-skills English practice	1 x week	English and Japanese

3.2 Research Questions

Considering the aforementioned trends on the intersection of AI and language teaching and learning, and the clear interest KGU has in the use of AI in education, a deeper exploration of how AI could be applied to these LC courses is now warranted. The following two research questions were developed by the researchers to focus the exploration.

1) *How could AI be used to enhance teaching in KGU LC courses?*

2) *How could AI be used to enhance learning in KGU LC courses?*

4. LC COURSE FOCUS

The following section provides an overview of English-language courses offered in the Language Center divided into three broad categories: content, testing, and remedial courses. The subsections for each course type explain the impact of AI on instruction and present practical examples of AI use in the classroom.

4.1 Content Courses
4.1.1 Introduction to Multidisciplinary Studies Courses

The LC at KGU offers Multidisciplinary Studies (MS) courses as English electives for students from any faculty that have an intermediate or higher level in English. Additionally, students from any faculty can attain an English minor designation on their degrees by completing the required number of English credits, including MS courses. These classes are intended as EMI classes rather than as Content and Language Integrated Learning (CLIL) classes, as the goals of the course are to teach the course topics in English without specific attention to teaching language at the same time, as opposed to other "English" classes that focus on teaching language skills. MS courses are standalone classes once a week for one 14-week semester. There are two broad categories: Language and Communication, and Culture and Society. Within these two categories, the topics vary greatly depending on the expertise and creativity of the instructors teaching the classes in any particular semester. The instructor must create a course on an original topic that can be adapted to various student subject knowledge levels, language skill levels, and interest levels. Students must learn the content and adapt to materials and methods that may be unfamiliar to them in their other courses. These courses can be considered preparation for operating in future academic or employment English medium environments.

4.1.2 Useful Approaches for Teachers in Using AI with MS Courses

MS course instructors have the difficult task of designing original courses which they may never have another opportunity to teach, and which must also be adaptable to a variety of student variables including a wide range of language or maturity levels, background knowledge, motivation, interest in the topic, intentions for taking the course, and even the number of students. In addition, although instructors often choose topics based on their expertise, sometimes courses are created to address student needs on topics about which a particular instructor may not have deep knowledge. What is more, very few (if any) commercial materials exist that explore such topics in sufficient depth to satisfy the requirements of an MS course while also being sufficiently decodable for all students. As such, adapting materials from different sources to address the varied needs of students in EMI courses is an area where AI may be most useful to teachers.

When planning a content course, a generative AI tool such as ChatGPT is a useful tool during the syllabus design phase. Even when an instructor has deep knowledge of a topic, it can be difficult to decide which points and details to include, and to find omitted but important points once a rough draft has been produced. After the instructor makes their own outline or rough draft, asking such an AI tool to expand, contract, or remake a course outline can reveal problems or omissions that can be corrected early in the course development process, saving time and increasing final course quality. The less familiarity a course instructor has with the topic, the more valuable AI is in avoiding mistakes in the course planning process.

As mentioned above, finding appropriate materials can be challenging for EMI classes, as they are often either oversimplified EFL materials or overly complex authentic materials. Solving this problem is a task AI excels at. Once a text is entered, AI can increase or decrease the language complexity or length of the text almost instantly. This allows the instructor to create several levels of the materials for different groups of students in the same or different classes. The instructor can also create preparation and summary materials to scaffold the more difficult texts and tasks. In addition, this same process can be used to break up an authentic text into more digestible chunks or create separate sets of materials to be used for jigsaw tasks or other information gap activities. AI can also create versions of texts with glossaries or cloze activities in seconds that would take prohibitive amounts of time for an instructor to create themselves.

4.1.3 Case Study of the Use of AI with one MS Course

Canadian cultural studies classes are periodically taught at the KGU LC. The instructor had taught the class twice before, but both times over 5 years ago. The first time the course was taught as a survey course, focussing on history. It

consisted of many challenging reading texts and written assignments that were difficult for the learners, and written assignments that were also felt to be troublesome by the learners. To rectify problems in the first class, the second iteration of the class focussed more on popular culture with mainly listening and speaking activities. However, although enjoyable, this seemed to lack rigor for the higher-level abilities of the students who happened to be enrolled that semester. The third iteration of the course aimed to combine the approaches and achieve a balance so the syllabus and materials could be used on a consistent basis no matter the class composition.

Unfortunately, only one learner signed up for the class in the most recent semester, and although their English skill was intermediate, they struggled to use English without significant support. The initial 25% of the class consisted of basic geographic, historical, and sociological material that proved difficult despite being simplified and abbreviated from the first iteration of the course. As an Art History major, the learner expressed interest in the parts of the material that touched on art. Before the era of readily available generative AI tools, it would have been very difficult to deviate from the prepared materials of a course in the middle of the course. However, with only one student and the new availability of AI such as ChatGPT, the second 25% of the course was changed to an expansion and exploration of Pacific Northwest First Nations art. Original written materials were available for the student as a reference, but the teaching material was adapted using the help of such AI tools. In addition, video materials were supplemented with background materials on the artists, their methods, and works to scaffold the video materials for greater comprehensibility and learning.

After the mid-term evaluations, the student expressed they both enjoyed and learned much more from the second quarter of the course than the first quarter. After exploring a few Canadian culture topics including literature, TV, and film the learner expressed interest in focussing on the well-known story of Anne of Green Gables and the instructor thought this material could reinforce some of the previously studied topics and give the course more focus. However, there is no ready-made Anne of Green Gables 10-hour intermediate university course available. It had to be constructed with the help of generative AI tools. First the main "text" had to be chosen. The Anne of Green Gables story has been presented in many formats, but many were too long to be finished during the course. The original novel is over 100,000 words long and difficult to order on short notice, so it was decided to use the 2016 film adaptation that was available in the LC's AV library. Before watching and studying the film, the background of Prince Edward Island where the story takes place, the historical age, and the author were studied with materials created using AI. The film was split into 4 parts of 20-25 minutes per

class. No transcript was available, but from the teacher's notes used as prompts, ChatGPT could create comprehension questions and answers with explanations and vocabulary lists for pre and post-viewing study. The student could then correct and expand their own notes.

From this example, we can see AI can greatly assist the instructor by allowing them to adapt to student needs by quickly creating customized supplemental and even core materials within a reasonable amount of time and effort.

4.1.4 Useful Approaches for Learners in Using AI on MS Courses

Initially, this course was designed without the use of AI in mind. The initial evaluation instruments were to be a personal journal each week and handwritten tests at the mid-term and final point of the course to reduce the possibility of the students using AI in the course. However, as the course developed as described above, the student instinctively used AI in various ways that enhanced their learning and, thus, several other ways to utilize AI became apparent that can be used in future iterations of the class:

1. After taking their own notes and examining the notes of the teacher for each section of the film, the students can use these two sets of notes to research and explore the most interesting topics using AI. These AI-generated research notes can be used as a basis for the personal reflection journal entries for each week. This helps the student autonomously create their writing with minimal help from the instructor.

2. In this instructor's experience, choosing a final essay or presentation topic is an activity Japanese students often struggle with. Rather than the teacher coaxing out a topic from the student or producing a long list of topics written by the teacher, AI can be used autonomously or collaboratively with the teacher to explore possible topics. Once a student has a general topic they want to explore, they can brainstorm using AI to create a variety of essay topics that can be then chosen from and expanded by the student.

3. Students can use AI to find and summarize lengthy secondary sources to be incorporated into the main draft. Students must learn to independently check that the sources suggested by AI are authentic.

4. Once the project is a finished rough draft, the AI (Grammarly and ProWritingAid) can be given the role of a copywriter to find basic errors or be given the role of an editor (ChatGPT) to help find more substantive errors and suggest revisions.

From this case study, we can see AI assistance can transform students' usual study modes. AI brings students much more autonomy in their tasks, such as idea

generation, research and data collection, and revision. AI can greatly reduce student dependence on the instructor and raise the level of work produced in content-based courses.

4.2 Testing Courses
4.2.1 Introduction to TOEIC Courses

The LC at KGU offers a Skills-Based English: TOEIC course designed to instruct learners on the TOEIC Listening and Reading (L+R) Test, to provide practice opportunities and to foster the skills required for success in the test. The fourteen-week course aims to familiarize learners with the test structure, build test-taking skills and strategies, and allow them to practice different sections of the TOEIC L+R Test (Language Center, 2019). To maximize the efficient use of limited time during the course, it is crucial to concentrate on key factors commonly associated with TOEIC achievement. Trew (2007), demonstrates that TOEIC success is closely linked to the following factors, which have been listed by the authors in Table 2.

Trew emphasizes that "Vocabulary is arguably the single most significant factor in doing well on the test" (2007) and underscores the need for learners to adopt an organized vocabulary study system to enhance their TOEIC-taking ability. Consequently, it is reasonable to assert that an AI-supported study program should prioritize the critical aspects outlined in Table 2. The following sections will examine how AI can be effectively utilized by both teachers and learners to enhance TOEIC-taking ability.

TABLE 2
A table outlining the test-taking and linguistic skills needed for success in the TOEIC test
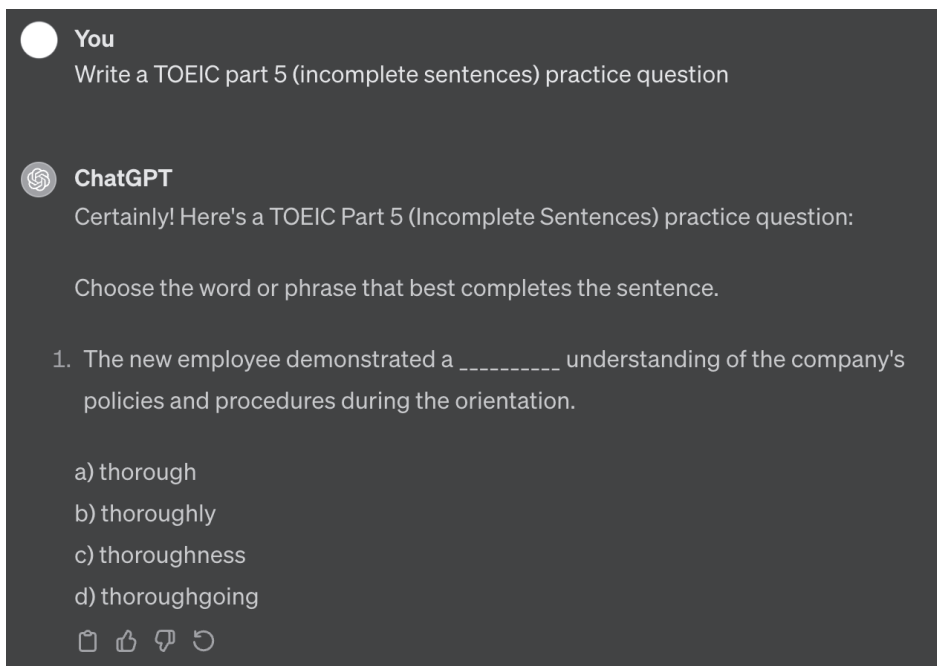
Test-Taking Skills	Linguistic Skills
Familiarity with the test format, instructions, and question types	Familiarity with the different native-speaking accents
Time management	Awareness of the sound changes that occur in natural English speech
Efficiency of information processing	Understanding language in use (conversational English)
Awareness of features that can make incorrect answer choices	Vocabulary and grammatical understanding

4.2.2 Useful Approaches for Teachers in Using AI with TOEIC Courses

One potential application of AI for educators, as outlined in the literature review section (i.e. Pack & Maloney, 2023), is its role as a research assistant. Natural language processing-enabled platforms, such as ChatGPT, can offer specific insights into test formats, strategies, and question types. Additionally, NLP platforms can help guide educators in effectively integrating AI into the classroom, offering opportunities for refinement based on feedback. AI also serves as a valuable materials-generating tool, creating practice texts and questions to enhance learners' test-taking skills. For instance, NLP AI can produce diverse reading and listening materials, while AI voice generation software such as ElevenLabs Generative Voice AI (ElevenLabs, 2024) facilitates listening practice with varied accents, enabling instructors to generate substantial instructional content more quickly and efficiently, without reliance on multiple textbooks. Additionally, including previously identified key vocabulary in these AI-generated materials may improve vocabulary learning since spaced repetition of vocabulary items has been shown to improve retention (Baturay et al, 2009). These applications, from research assistance to materials generation, can help teachers prepare better test-specific instruction.

Arguably, the most compelling application of AI in testing course classrooms lies in its potential to support learners in autonomous study. Since AI can be used for the generation of learning materials, it might offer learners the opportunity for independent study beyond the traditional classroom setting. This is potentially very beneficial for learners taking test-taking courses as it might allow them to be less reliant on the instructor or conventional textbooks. The stakes for these tests can be high, for instance, determining eligibility for study-abroad programs. As such, significant independent study is recommended in addition to the limited class time. However, to realize this potential, learners require guidance on effectively utilizing and maximizing the applications of AI in their self-directed study. In this regard, teachers could play a key role in instructing learners on utilizing AI to generate practice materials and leveraging Computerised Dynamic Assessment models to gain vital experience and feedback outside the classroom. As previously highlighted, learners need exposure to various question and text types. Teachers can guide learners in formulating specific prompts for NLP models, facilitating the creation of relevant texts and practice questions (Figure 1).

FIGURE 1

Screenshot of a TOEIC style question prompt and output from ChatGPT

You
Write a TOEIC part 5 (incomplete sentences) practice question

ChatGPT
Certainly! Here's a TOEIC Part 5 (Incomplete Sentences) practice question:

Choose the word or phrase that best completes the sentence.

1. The new employee demonstrated a _____ understanding of the company's policies and procedures during the orientation.

a) thorough
b) thoroughly
c) thoroughness
d) thoroughgoing

Note. From OpenAI. (2023). ChatGPT [Large language model]. https://chat.openai.com/chat

However, it is also important that teachers understand the limitations of AI. For example, concerns have been raised about the use of AI for error recognition (Rebolledo Font de la Vall & Gonzalez Araya, 2023) and the accuracy and authenticity of AI-generated content (Creely, 2023). It therefore seems prudent that teachers understand the limitations of AI when providing AI-generated TOEIC practice materials. In particular, it is suggested that teachers check that content created by AI properly aligns with TOEIC question format, and that the question-and-answer choices accurately replicate those usually found in TOEIC test. However, if educators proceed with caution, they could utilize the potential of AI to help learners successfully achieve their goals in test-taking courses at the KGU LC.

*4.2.3 Useful Approaches for Learners in Using AI on TOEIC Courses*

For learners, AI may serve as an important resource, providing them with an extensive array of practice materials to support them in achieving their test-taking goals. NLP models might be used to generate substantial volumes of diverse reading materials (Bezirhan & von Davier, 2023), thus exposing learners to varied linguistic contexts. Complementarily, AI voice generation software can facilitate the

vocalization of written scripts, affording learners targeted listening practice to build their listening comprehension skills (Sha, 2009). Additionally, NLP models could be used to provide TOEIC vocabulary lists for learners and then be used to provide simplified vocabulary explanations and use examples (Kohnke et al, 2023), as well as providing diagnostic information on vocabulary learning (Jeon, 2023). Furthermore, as discussed in the literature review, ASR-enabled chatbots can help learners develop their speaking and listening skills by giving them opportunity to practice using English outside the classroom. Through the generation of test practice materials and questions, and the provision of practice opportunities, learners may gain valuable experience needed for TOEIC success.

AI could play a crucial role in delivering feedback and comprehensive support to learners enrolled in test-taking courses. As Trew (2007) indicated, vocabulary is key to success on the TOEIC test. Utilizing NLP platforms, learners may access example sentences and detailed explanations clarifying essential vocabulary. Additionally, AI can offer feedback and error correction on learner-generated example sentences of new vocabulary, facilitating improved vocabulary practice without the need for teacher feedback (Figure 2). This might be further extended to feedback on test questions, where AI not only identifies correct answers but also illuminates the rationale behind incorrect choices, enhancing learners' comprehension. Additionally, AI could also provide support for learners by offering valuable insights into test structures and effective test-taking strategies. Finally, low-level learners and learners unfamiliar with EMI can utilize AI for in-class support or assistance, particularly in cases where the instructor may not be able to immediately provide it. By utilizing MT, learners can gain a deeper understanding of texts and explanations.

Learners do, however, need to understand the limitations of AI. For example, ChatGPT "has limited knowledge of world [*sic*] and events after 2021 and may also occasionally produce harmful instructions or biased content" (Natalie, 2024). Therefore, platforms such as ChatGPT may not be able to provide accurate information regarding the latest TOEIC testing procedures. Furthermore, learners need improved digital literacy, training, and understanding of AI's limitations to safely use it in language learning (Kohnke et al., 2023). However, as long as learners are aware of the limitations, through the provision of learning materials, feedback, and learner support, AI may become an instrumental tool for learners in achieving their goals in LC testing courses.

FIGURE 2
Screenshot of error correction using ChatGPT

Note. From OpenAI. (2023). ChatGPT [Large language model].
https://chat.openai.com/chat
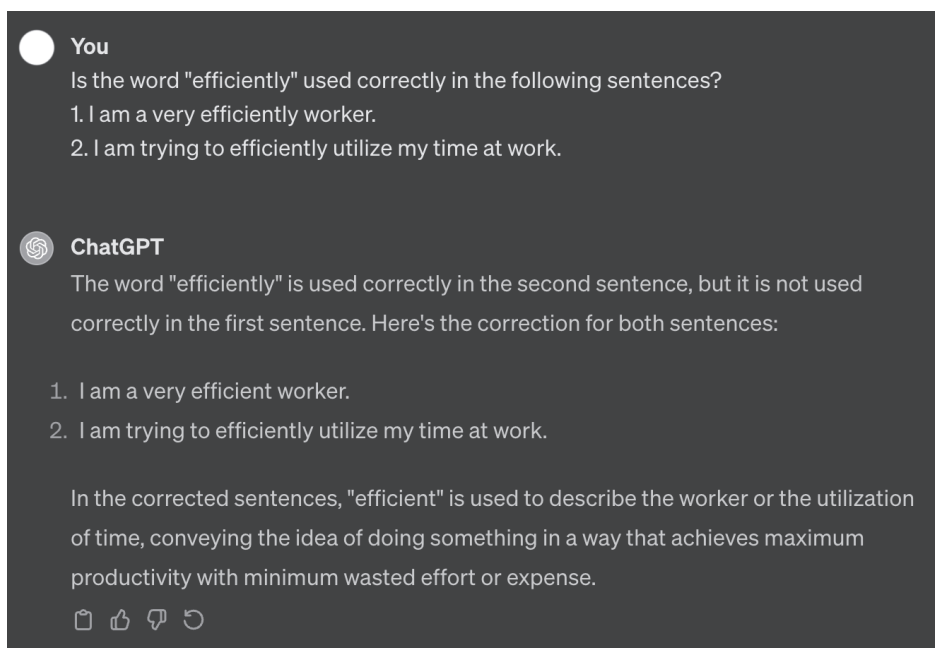
4.3 Remedial Language Courses
4.3.1 Introduction to Remedial Language Courses

      Skills-Based English (SBE) Basic is one of several elective courses offered through the LC. Typically, these 14-week classes are intended for learners who may not meet the minimum TOEFL/TOEIC requirements to enroll in Intensive English classes (Language Center, 2019), but desire to take a general four-skills English course. As alluded to above, SBE Basic courses are unique in the sense that, while most learners have low-level English ability, a small number of mid to high-level English proficiency learners may also attend the same classes. Such learners may have returned from studying abroad, are in the final years of their undergraduate degree and may need English credit or are international students themselves. However, curriculum design and instruction for SBE Basic courses are tailored to the low-proficiency learners, which poses several challenges for teachers.

      In 2017, the LC established several Introductory English courses to serve the educational needs of first year learners who tend to have below average English proficiency (Language Center, 2019). These 14-week introductory English classes

are offered over the course of two years and are divided by both skill groups and student year. For example, over two years, enrolled students take Section A, which focuses on listening and speaking skills and is referred to as Intro IA and IIA, while simultaneously taking Section B, centering on reading, and writing, referred to as Intro IB and IIB. These courses are also tightly coordinated as Section A classes are taught by first-language speakers of English, with Section B classes are taught by first-language speakers of Japanese. Additionally, every teacher for each section in accordance with their classification (i.e. all sections of Intro IIA) will use a predetermined commercial textbook.

The overall purpose of both SBE Basic and Intro classes is to support and help learners improve their English ability to a level suitable for university (Language Center, 2019). However, while learners enrolled in either course have the greatest need to improve their language proficiency, the number of opportunities offered to them is limited to once a week. Additionally, with the potential challenges of class dynamics with mixed English levels in SBE Basic, the introduction of AI-based applications to help supplement and support learners' English skills development should be seen as advantageous.

4.3.2 Useful Approaches for Teachers in Using AI with Remedial Courses

There are an extensive number of AI applications available for teachers, but as the literature highlights, generative AI can be utilized to supplement or expand curriculum content to meet the needs of individual learners.

For SBE Basic courses specifically, as mentioned in the previous section, the potential challenges of having mid to high-proficiency learners in these classes is something teachers need to anticipate. While there is no required textbook, teachers have some autonomy with methodology if attainment goals are met. Thus, teachers can utilize NLP-enabled platforms, such as ChatGPT, to differentiate content to accommodate the potential varying levels of English. For example, providing an accompanying reading component on a chosen class topic that has been tailored to different Common European Framework of Reference for Languages (CEFR) levels is one potential use of foundation models like ChatGTP. However, it's important to note that teachers should not rely on the AI-generated output alone, as it is not infallible. Thus, teachers need to check AI-generated content for, among other things, accuracy or tone of language used, which may then need adapting to make it level-appropriate and interesting for the intended learners. For example, with the A2 CEFR level reading output from ChatGPT, the teacher would need to run the content through a text-inspector application (there are several free versions available online) to determine that the reading is indeed in line with A2 CEFR levels.

Regarding Intro courses, one common issue with general four-skill commercial textbooks is the limited number of practice tasks that accompany target language within a unit, and the lack of opportunities to consolidate newly learned language in a creative or fun way. Therefore, teachers can also use ChatGPT to provide supplemental content for additional practice in or outside the classroom. For example, a learning objective from the textbook *Interchange 1* (Richards, 2013), prescribed for Intro courses, targets asking yes/no questions and giving short answers with the '*be*' verb. The textbook only provides four practice tasks, which is inadequate for learners in university needing to make noticeable improvement in their language competence. Therefore, additional tasks can quickly be created by giving ChatGTP prompts such as "Create 15 yes/no questions to practice the verb 'be' with multiple answer choices". The output can then be adapted to allow students to further practice the same target language before moving on to the next component of the lesson.

In summary, by incorporating the use of AI-based applications into course curriculum, teachers can be more adaptive to classroom dynamics and the needs of varying learners. However, teachers should also recognize potential challenges of using AI. For instance, understanding how to best use AI takes time and, in the absence of formal training, experimentation by teachers to learn how to use it effectively. For example, in the case of a generative AI chatbot such as ChatGPT, teachers may struggle with phrasing prompts appropriately to produce the desired content. Additionally, teachers need to be cautious in checking that AI generated content is level-appropriate and engaging, does not perpetuate bias (Memarian & Doleck, 2023), or dehumanize the learning experience for students.

4.3.3 Useful Approaches for Learners in Using AI on Remedial Courses

Teachers of SBE Basic and Intro courses first need to carefully consider which AI-based applications meet the needs of each course and the varying levels of learner English abilities and motivation. As alluded to previously, both courses have students with the greatest need to improve their language ability but have limited opportunities to practice all skills effectively. Explicitly, students in these courses often lack conversational confidence and competence. Therefore, according to the literature (i.e. Annamalai et al., 2023; Lee & Hwang, 2022; and Tai & Chen, 2023), they might benefit the most from AI systems that utilize ASR-enabled chatbots or intelligent personal assistants to help support their communicative development.

For learners in SBE Basic and Intro courses, a lack of confidence to use English among peers voluntarily can be quite common. Considering limited class time and classes only held once a week, teachers of these courses should consider utilizing AI-based platforms for learners to engage in meaningful language practice outside the classroom. As the literature states, ASR-enabled chatbots or LLM

platforms with intelligent personal assistants can better assist learners by affording them the time to engage in the assigned content at their own pace (Jeon, 2022), get immediate feedback on oral language practice or help build communicative competence by having sustained conversations in the target language (Xu et al. 2021). One such example is the commercial learning platform, *English Central*, and its use of MiMi, promoted as, "...the world's first AI-powered, conversational English learning tool…" (English Central, 2024, English Central blog, para. 1). With MiMi, learners can freely converse on a number of topics while also receiving instant feedback on fluency, pronunciation and grammar accuracy.

For Intro course students specifically, through sustained observation and teacher feedback, standardized textbooks with a low-level focus tend to have generic topics or focus on language content that is repetitive. Consequently, this can lead to learners being demotivated because they may falsely feel they know the material already, having practiced it several times throughout primary and secondary schooling and now at university, and may prefer other themes to practice and improve their English. Thus, ASR-enabled chatbots like MiMi, with access to thousands of accompanying videos, can also afford learners some autonomy over the topics they can learn and have conversational practice with detailed feedback at their own pace. This would ideally help to lower language performance anxiety and promote more active engagement in the classroom.

In summary, providing learners with the opportunity to engage with platforms that utilize AI as an additional, alternative option to required textbooks can potentially improve motivation. Doing so may also assist learners in achieving communicative competence and reaching both personal proficiency goals and university objectives.

5. CONCLUSION

This paper surveyed some ways in which artificial intelligence might be used at the KGU LC to enhance teaching and learning. A review of the literature first revealed the diverse ways in which AI is being applied in wider education and in language teaching, learning, and in research in those fields, both globally and in Japan. Next, the LC was seen to be a particularly appropriate location for exploratory work in these areas, given the priority placed on both AI and language learning at KGU. Last, a diverse array of courses offered by the KGU LC were described in detail to contextualize our recommendations for teaching and learning.

As for teaching, it was suggested that AI would be especially useful for LC teachers in the areas of syllabus design, material adaptation, and content generation. LC teachers are therefore encouraged to explore potential applications of AI during different stages of the planning cycle. For learners, of particular benefit may be the

capabilities of AI to facilitate research and topic selection, vocabulary building, and autonomous language study. Additionally, both teachers and learners can benefit from the feedback and support that can be provided by AI. For instance, integration of AI into syllabus design, course development, and materials adaptation is potentially advantageous because it allows better tailoring of instruction to the specific needs of the learners. This could make syllabus and lesson planning more efficient and content more engaging, as well as allowing for more dynamic adaptation depending on the specific class makeup. Similarly, it is recommended that teachers work closely with learners to help them leverage AI to explore content covered in class in more depth, and for their own independent language learning. As difficult as this may be given the pace of change and development, moving forward it will likely be important for teachers and learners to be as familiar as possible with the capabilities of the technology.

The potential benefits of AI, described herein, would seem to strongly support further investigation of its inclusion as a teaching and learning tool alongside more traditional methods. This paper only explored a limited number of potential AI applications to a small number of courses. More time and experimentation would be required to systematically assess the impact of the suggestions outlined in this study. However, there is a clear need for more coordinated exploration of the longer-term impacts of AI integration on both language teaching and language learning at the KGU LC. For instance, qualitative studies could examine the experiences of instructors as they apply our suggestions. Additionally, quantitative studies could measure the impact of AI on different aspects of LC learners' language proficiency, content knowledge, or autonomy.

In closing, this paper has hinted at the transformative potential of AI for the LC. While there are limitations in the use of AI in language teaching, such as the increased need for student digital literacy, concerns over the accuracy of AI-generated content, and AI's potential lack of up-to-date information, AI may yet come to function as an invaluable ally for teachers and learners alike, or even redefine the roles of what it means to teach or learn about (or in) another language. In a world that is likely to be increasingly shaped by AI, our commitment to leveraging these technologies to best achieve our pedagogical or learning goals will be even more crucial.

6. REFERENCES

Adamopoulou, E., & Moussiades, L. (2020). Chatbots: History, technology, and applications. *Machine Learning with Applications*, *2*, 100006. https://doi.org/10.1016/j.mlwa.2020.100006

Alharbi, S., Alrazgan, M., Alrashed, A., Alnomasi, T., Almojel, R., Alharbi, R., Alharbi, S., Alturki, S., Alshehri, F., & Almojil, M. (2021). Automatic Speech Recognition: Systematic Literature Review. *IEEE Access*, *9*, 131858-131876. https://doi.org/10.1109/ACCESS.2021.3112535

Annamalai, N., Eltahir, M. E., Zyoud, S. H., Soundrarajan, D., Zakarneh, B., & Al Salhi, N. R. (2023). Exploring English language learning via Chabot: A case study from a self determination theory perspective. *Computers and Education: Artificial Intelligence*, *5*, 100148. https://doi.org/10.1016/j.caeai.2023.100148

Asimov, I. (1950). *I, Robot*. Doubleday.

Azuma, J. (2018). *New method of evaluating English speaking ability using AI* [Grant]. Kobe Gakuin University. https://cir.nii.ac.jp/crid/1040000781996812800

Belda-Medina, J., & Calvo-Ferrer, J. R. (2022). Using Chatbots as AI Conversational Partners in Language Learning. *Applied Sciences*, *12*(17), 8427. https://doi.org/10.3390/app12178427

Baturay, M. H., Yildirim, S. & Daloglu, A. (2009). Effects of web-based spaced repetition on vocabulary retention of foreign language learners. *Eurasian Journal of Educational Research*, *8*(34), 17-36. https://www.researchgate.net/publication/290097099_Effects_of_Web-Based_Spaced_Repetition_on_Vocabulary_Retention_of_Foreign_Language_Learners

Bender, E. M., Gebru, T., McMillan-Major, A., & Shmitchell, S. (2021, March). On the dangers of stochastic parrots: Can language models be too big? 🦜. In *Proceedings of the 2021 ACM conference on fairness, accountability, and transparency* (pp. 610-623).https://doi.org/10.1145/3442188.3445922

Bezirhan, U. & von Davier, M. (2023). Automated reading passage generation with OpenAI's large language model. *Computers and Education: Artificial Intelligence, 5*, 1-13. https://doi.org/10.1016/j.caeai.2023.100161

Bibauw, S., François, T., & Desmet, P. (2019). Discussing with a computer to practice a foreign language: research synthesis and conceptual framework of dialogue-based CALL. *Computer Assisted Language Learning*, *32*(8), 827-877. https://doi.org/10.1080/09588221.2018.1535508

Bond, M., Khosravi, H., De Laat, M., Bergdahl, N., Negrea, V., Oxley, E., Pham, P., Chong, S. W., & Siemens, G. (2024). A meta systematic review of artificial intelligence in higher education: a call for increased ethics, collaboration, and rigour. *International Journal of Educational Technology in Higher Education*, *21*(1). https://doi.org/10.1186/s41239-023-00436-z

Bringsjord, S., & Sundar Govindarajulu, N. (2022). Artificial Intelligence. In *The Stanford Encyclopedia of Philosophy (Fall 2022 Edition)*. https://plato.stanford.edu/archives/fall2022/entries/artificial-intelligence/

Cabinet Office. (2016). *Society 5.0*. https://www8.cao.go.jp/cstp/society5_0/

Cavalcanti, A. P., Barbosa, A., Carvalho, R., Freitas, F., Tsai, Y.-S., Gašević, D., & Mello, R. F. (2021). Automatic feedback in online learning environments: A systematic literature review. *Computers and Education: Artificial Intelligence*, *2*, 100027. https://doi.org/10.1016/j.caeai.2021.100027

Chen, Y.-L., Lo, S., & Cheng, J.-S. (2023). The Impact of Field-Flipped Courses on College Students' Self-Regulated Learning and Learning Performance Take a National University in Central Taiwan as an Example. *Journal of Advanced Computational Intelligence and Intelligent Informatics*, *27*(2), 281-291. https://doi.org/10.20965/jaciii.2023.p0281

Chidlow, S. M. (2023). *Kokusai-teki iryōjin ikusei no tame no AI o katsuyō shita Eigo iryō mensetsu jidō saiten shisutemu no kaihatsu* [Development of an AI-based automatic scoring system for English medical interviews for international medical personnel training]. [Grant]. Oita University. https://cir.nii.ac.jp/crid/1040858752024510592

Chiu, T. K. F., Moorhouse, B. L., Chai, C. S., & Ismailov, M. (2023). Teacher support and student motivation to learn with Artificial Intelligence (AI) based chatbot. *Interactive Learning Environments*, 1-17. https://doi.org/10.1080/10494820.2023.2172044

CiNii. (2023). *CiNii Research*. https://cir.nii.ac.jp/

Cotton, D. R. E., Cotton, P. A., & Shipway, J. R. (2023). Chatting and cheating: Ensuring academic integrity in the era of ChatGPT. *Innovations in Education and Teaching International*, 1-12. https://doi.org/10.1080/14703297.2023.2190148

Creely, E. (2023, October 29). The possibilities, limitations, and dangers of generative AI in language learning and literacy practices [Conference presentation]. International Graduate Research Symposium, Hanoi, Vietnam.

CSTI. (2022). *Society 5.0 nojitsugen ni muketa kyoiku・jinzaiikusei ni kansuru seisaku pakkeeji [A reform package on human resources and educational development for realising Society 5.0]*. https://www8.cao.go.jp/cstp/tyousakai/kyouikujinzai/saishu_print.pdf

de Wit, J., Schodde, T., Willemsen, B., Bergmann, K., De Haas, M., Kopp, S., Krahmer, E., & Vogt, P. (2018, February). The effect of a robot's gestures and adaptive tutoring on children's acquisition of second language vocabularies. In *Proceedings of the 2018 ACM/IEEE international conference on human-robot interaction* (pp. 50-58).

Divekar, R. R., Drozdal, J., Chabot, S., Zhou, Y., Su, H., Chen, Y., Zhu, H., Hendler, J. A., & Braasch, J. (2022). Foreign language acquisition via artificial intelligence and extended reality: design and evaluation. *Computer Assisted Language Learning*, *35*(9), 2332-2360. https://doi.org/10.1080/09588221.2021.1879162

Dodigovic, M. (2003). Natural Language Processing (NLP) as an Instrument of Raising the Language Awareness of Learners of English as a Second Language. *Language Awareness*, *12*(3-4), 187-203. https://doi.org/10.1080/09658410308667076

Dodigovic, M. (2007). Artificial Intelligence and Second Language Learning: An Efficient Approach to Error Remediation. *Language Awareness*, *16*(2), 99-113. https://doi.org/10.2167/la416.0

English Central (2021, May 11). EnglishCentral.com Launches AI-Powered conversational English learning chatbot. English Central. https://englishcentral.net/englishcentral-com-launches-ai-powered-conversational-english-learning-chatbot/

ElevenLabs. (2024). *Generative Voice AI*. https://elevenlabs.io/

Farrokhnia, M., Banihashem, S. K., Noroozi, O., & Wals, A. (2023). A SWOT analysis of ChatGPT: Implications for educational practice and research. *Innovations in Education and Teaching International*, 1-15. https://doi.org/10.1080/14703297.2023.2195846

Feng, S., Magana, A. J., & Kao, D. (2021, October 13-16). *A Systematic Review of Literature on the Effectiveness of Intelligent Tutoring Systems in STEM* [Conference Presentation]. 2021 IEEE Frontiers in Education Conference (FIE). https://doi.org/10.1109/FIE49875.2021.9637240

Foroughi, B., Senali, M. G., Iranmanesh, M., Khanfar, A., Ghobakhloo, M., Annamalai, N., & Naghmeh-Abbaspour, B. (2023). Determinants of Intention to Use ChatGPT for Educational Purposes: Findings from PLS-SEM and fsQCA. *International Journal of Human–Computer Interaction*, 1-20. https://doi.org/10.1080/10447318.2023.2226495

Fryer, L. K., Ainley, M., Thompson, A., Gibson, A., & Sherlock, Z. (2017). Stimulating and sustaining interest in a language course: An experimental comparison of Chatbot and Human task partners. *Computers in Human Behavior*, *75*, 461-468. https://doi.org/10.1016/j.chb.2017.05.045

Fryer, L. K., Coniam, D., Carpenter, R., & Lăpușneanu, D. (2020). Bots for language learning now: Current and future directions. *Language Learning & Technology*, *24*(2), 8–22.

Gayed, J. M., Carlon, M. K. J., Oriola, A. M., & Cross, J. S. (2022). Exploring an AI-based writing Assistant's impact on English language learners. *Computers and Education: Artificial Intelligence*, *3*, 100055. https://doi.org/10.1016/j.caeai.2022.100055

Hew, K. F., Huang, W., Du, J., & Jia, C. (2023). Using chatbots to support student goal setting and social presence in fully online activities: learner engagement and perceptions. *Journal of Computing in Higher Education*, *35*(1), 40-68. https://doi.org/10.1007/s12528-022-09338-x

Hidri, S., & Pileh Roud, L. F. (2020). Developing and using hints in computerized dynamic assessment of a TOEFL iBT reading exam. *Heliyon*, *6*(9), e04985. https://doi.org/10.1016/j.heliyon.2020.e04985

Higashiguchi, T. (2023). *AI gijutsu tou wo katsuyou shi, kobetsu saiteki na manabi wo juujitsu saseru shougakkou eigo kyouzai no kaihatsu* [Development of

elementary school English teaching materials that utilize AI technology and other means to enrich individually optimized learning]. [Grant]. Kansai University. https://cir.nii.ac.jp/crid/1040295802078790528

Hockly, N. (2019). Automated writing evaluation. *ELT Journal*, *73*(1), 82-88. https://doi.org/10.1093/elt/ccy044

Huang, W., Hew, K. F., & Fryer, L. K. (2022). Chatbots for language learning—Are they really useful? A systematic review of chatbot-supported language learning. *Journal of Computer Assisted Learning*, *38*(1), 237-257. https://doi.org/10.1111/jcal.12610

Huawei, S., & Aryadoust, V. (2023). A systematic review of automated writing evaluation systems. *Education and Information Technologies*, *28*(1), 771-795. https://doi.org/10.1007/s10639-022-11200-7

Hwang, G.-J., & Chang, C.-Y. (2023). A review of opportunities and challenges of chatbots in education. *Interactive Learning Environments*, *31*(7), 4099-4112. https://doi.org/10.1080/10494820.2021.1952615

Hwang, G.-J., & Chien, S.-Y. (2022). Definition, roles, and potential research issues of the metaverse in education: An artificial intelligence perspective. *Computers and Education: Artificial Intelligence*, *3*, 100082. https://doi.org/10.1016/j.caeai.2022.100082

JALT. (2023). *JALT 2023 Growth Mindset in Language Education Conference Handbook*. JALT. https://drive.google.com/file/d/1-Y3PSibgF7FhDqHXKFuHdx6rVUM6j51A/view

Jeon, J. (2022). Exploring AI chatbot affordances in the EFL classroom: young learners' experiences and perspectives. *Computer Assisted Language Learning*, 1-26. https://doi.org/10.1080/09588221.2021.2021241

Jeon, J. (2023). Chatbot-assisted dynamic assessment (CA-DA) for L2 vocabulary learning and diagnosis. *Computer Assisted Language Learning*, *36*(7), 1338-1364. https://doi.org/10.1080/09588221.2021.1987272

Ji, H., Han, I., & Ko, Y. (2023). A systematic review of conversational AI in language education: focusing on the collaboration with human teachers. *Journal of Research on Technology in Education*, *55*(1), 48-63. https://doi.org/10.1080/15391523.2022.2142873

Kabudi, T., Pappas, I., & Olsen, D. H. (2021). AI-enabled adaptive learning systems: A systematic mapping of the literature. *Computers and Education: Artificial Intelligence*, *2*, 100017. https://doi.org/10.1016/j.caeai.2021.100017

Kaneko, J. (2020). *Development of a Semi-Automatic Scoring System using AI* [Grant]. Mie University and Yamagata University. https://cir.nii.ac.jp/crid/1040285300698122752

Kaneko, J. (2023). *The Development of Mathematical Models using Machine Learning with Educational Big Data for Language Acquisition and Individually Optimized Learning* [Grant]. Mie University. https://cir.nii.ac.jp/crid/1040858752023675136

Katata, F. (2019). *Ootoringaru jidai ni okeru gengo unyou nouryoku zou no kouchiku to shin gakushuu senryaku no jissen* [Constructing a vision of

language proficiency in the autolingual era and implementing new learning strategies]. [Grant]. Waseda University. https://cir.nii.ac.jp/crid/1040848250613073152

Kim, H.-S., Cha, Y., & Kim, N. Y. (2021). *Effects of AI chatbots on EFL students' communication skills*. Korean Journal of English Language and Linguistics, *21*, 712-734. http://journal.kasell.or.kr/xml/30253/30253.pdf

Kobari, K. (2019). *A study on English education using AI, VR, and ICT* [Grant]. Aoyama Gakuin University. https://cir.nii.ac.jp/crid/1040282256992591488

Kobayashi, W. (2022). Society 5.0 ni okeru Eigo kyōiku:
Gurōbaru kyōiku to ibunka komyunikēshon nōryoku saikō [English Education in Society 5.0: Reconsidering Global Education and Intercultural Communication Skills]. *Kankeisei no Kyōikugaku [The Journal of Engaged Pedagogy]*, 21(1), 15-31. https://doi.org/10.51077/epajournal.21.1_15

Kohnke, L., Moorhouse, B. L., & Zou, D. (2023). ChatGPT for Language Teaching and Learning. *RELC Journal*, *54*(2), 537-550. https://doi.org/10.1177/00336882231162868

Kuhail, M. A., Alturki, N., Alramlawi, S., & Alhejori, K. (2023). Interacting with educational chatbots: A systematic review. *Education and Information Technologies*, *28*(1), 973-1018. https://doi.org/10.1007/s10639-022-11177-3

Kuramitsu, K. (2023). *LLM-based Learning Assistance for Python and Data Science Education* [Grant]. Japan Women's University. https://cir.nii.ac.jp/crid/1040577277052130944

Kuznetcova, I. (2023, July 06). *Unlocking the "E" in EMI: Supporting students' language development through the curricular integration of ChatGPT* [Conference Presentation]. 6th J-CLIL Annual Bilingual Conference, Tohoku University, Japan.

Kwansei Gakuin University. (2020). *School of International Studies Entrance Examination Information for International Students for 2020 『International Admission』*. Kwansei Gakuin University School of International Studies. https://global.kwansei.ac.jp/cms/kwansei_foreign/pdf/academic/undergraduate/admission/0000175116.pdf

Kwansei Gakuin University. (2021). *AI katsuyō jinzai ikusei puroguramu no sō matome jugyō daiichi-dan 'AI katsuyō hatten enshū I' o jisshi* [Implementation of the first part of the comprehensive lesson program for the AI Talent Development Program, 'Advanced AI Application Exercises I']. https://www.kwansei.ac.jp/news/detail/4262?_gl=1*nz29tc*_gcl_au*NDY5MzMwMzI1LjE2OTY2Mzg4NDE

Kwansei Gakuin University. (2023). *AI katsuyō jinzai ikusei puroguramu* [AI Talent Development Program]. https://www2.kwansei.ac.jp/ai/

Laine, J., Lindqvist, T., Korhonen, T., & Hakkarainen, K. (2022). Systematic Review of Intelligent Tutoring Systems for Hard Skills Training in Virtual Reality Environments. *International Journal of Technology in Education and Science*, *6*(2), 178-203. https://doi.org/10.46328/ijtes.348

Language Center. (2019). *The Language Center -- Intensive English Program Handbook*. Kwansei Gakuin University.

Language Center. (2023). *Gengo Kyoiku Kenkyu Sentaa Nitsuite* [About the Language Center]. https://www.kwansei.ac.jp/education/language/center

Lee, H., & Lee, J. H. (2022). Social robots for English language teaching. *ELT Journal*, *76*(1), 119-124. https://doi.org/10.1093/elt/ccab041

Lee, J.-Y., & Hwang, Y. (2022). A meta-analysis of the effects of using AI chatbot in Korean EFL education. *Stud. Engl. Lang. Lit*, *48*, 213-243. http://dx.doi.org/10.21559/aellk.2022.48.1.011

Lee, J. H., Yang, H., Shin, D., & Kim, H. (2020). Chatbots. *ELT Journal*, *74*(3), 338-344. https://doi.org/10.1093/elt/ccaa035

Lee, S.-M. (2023). The effectiveness of machine translation in foreign language education: a systematic review and meta-analysis. *Computer Assisted Language Learning*, *36*(1-2), 103-125. https://doi.org/10.1080/09588221.2021.1901745

Li, Y., Chen, C.-Y., Yu, D., Davidson, S., Hou, R., Yuan, X., Tan, Y., Pham, D., & Yu, Z. (2022, June). *Using Chatbots to Teach Languages* [Conference Presentation]. Ninth ACM Conference on Learning @ Scale, New York City. https://doi.org/10.1145/3491140.3528329

Liang, J.-C., Hwang, G.-J., Chen, M.-R. A., & Darmawansah, D. (2023). Roles and research foci of artificial intelligence in language education: an integrated bibliographic analysis and systematic review approach. *Interactive Learning Environments*, *31*(7), 4270-4296. https://doi.org/10.1080/10494820.2021.1958348

Liu, G., & Ma, C. (2023). Measuring EFL learners' use of ChatGPT in informal digital learning of English based on the technology acceptance model. *Innovation in Language Learning and Teaching*, 1-14. https://doi.org/10.1080/17501229.2023.2240316

Mariel, W. C. F., Mariyah, S., & Pramana, S. (2018). Sentiment analysis: a comparison of deep learning neural network algorithm with SVM and naïve Bayes for Indonesian text. *Journal of Physics: Conference Series*, *971*, 012049. https://doi.org/10.1088/1742-6596/971/1/012049

Marzuki, Widiati, U., Rusdin, D., Darwin, & Indrawati, I. (2023). The impact of AI writing tools on the content and organization of students' writing: EFL teachers' perspective. *Cogent Education*, *10*(2). https://doi.org/10.1080/2331186x.2023.2236469

Memarian, B., & Doleck, T. (2023). Fairness, Accountability, Transparency, and Ethics (FATE) in Artificial Intelligence (AI) and higher education: A systematic review. *Computers and Education: Artificial Intelligence*, *5*, 100152. https://doi.org/10.1016/j.caeai.2023.100152

MEXT. (2018a). *6. Society 5.0 ni muketa jinzai ikusei nitsuite* [6. On the Development of Human Resources for Society 5.0]. https://www.mext.go.jp/component/a_menu/education/detail/__icsFiles/afiel dfile/2018/11/19/1411060_02_1.pdf

MEXT. (2018b). *Society 5.0 ni muketa jinzai ikusei nitsuite ~shakaigakawaru, manabi ga kawaru* [On the Development of Human Resources for Society 5.0~ Changing Society, Changing Learning]. https://www.mext.go.jp/component/a_menu/other/detail/__icsFiles/afieldfile/2018/06/06/1405844_002.pdf

Microsoft. (2023). *Language learning with Azure AI Speech*. https://learn.microsoft.com/en-us/azure/ai-services/speech-service/language-learning-overview

Mousavinasab, E., Zarifsanaiey, N., R. Niakan Kalhori, S., Rakhshan, M., Keikha, L., & Ghazi Saeedi, M. (2021). Intelligent tutoring systems: a systematic review of characteristics, applications, and evaluation methods. *Interactive Learning Environments*, *29*(1), 142-163. https://doi.org/10.1080/10494820.2018.1558257

Moussalli, S., & Cardoso, W. (2020). Intelligent personal assistants: can they understand and be understood by accented L2 learners? *Computer Assisted Language Learning*, *33*(8), 865-890. https://doi.org/10.1080/09588221.2019.1595664

Nakamura, T. (2022). *Shougakkou eigo kyouiku ni okeru jidou ni saitekika sareta AI abataa no kaihatsu to genba e no dounyuu* [Development and implementation of AI avatars optimized for children in elementary school English education]. [Grant]. Nagasaki University. https://cir.nii.ac.jp/crid/1040010457614690432

Nakano, A. (2020). *AI gijutsu wo mochiita nihonjin eigo gakushuusha no tame no riidabiriti yosoku moderu no kaihatsu* [Development of a readability prediction model for Japanese English learners using AI technology]. [Grant]. Kurume National College of Technology. https://cir.nii.ac.jp/crid/1040848250651569792

Nakano, A. (2023). *Kyouki jisho to AI gijutsu wo mochiita nihonjin eigo gakushuusha no tame no riidabiriti yosoku moderu no kaihatsu* [Development of a readability prediction model for Japanese English learners using collocation dictionaries and AI technology]. [Grant]. Kurume National College of Technology . https://cir.nii.ac.jp/crid/1040577277046977536

Nakano, K. (2023). *A quantitative analysis research on the correlation between the embodiment principles and the development of metalinguistic ability in foreign language acquisition* [Grant]. Kansai Gaidai College . https://cir.nii.ac.jp/crid/1040858752023715200m

Natalie. (2024). *What is ChatGPT? Commonly asked questions about ChatGPT*. OpenAI. https://help.openai.com/en/articles/6783457-what-is-chatgpt

Nozaki, H. (2021). *AI honyaku wo mochiita tagengo unyou nouryoku no shuutoku to gengo gakushuu kankyou no kouchiku・gengo kyouiku no arikata no kaimei* [Acquisition of multilingual proficiency using AI translation, construction of language learning environments, and elucidation of the nature of language education]. [Grant]. Aichi University of Education. https://cir.nii.ac.jp/crid/1040850857196678528

O'Grady, S. (2023). An AI Generated Test of Pragmatic Competence and Connected Speech. *Language Teaching Research Quarterly*, *37*, 188-203. https://doi.org/10.32038/ltrq.2023.37.10

Okada, T. (2023). *Research and development of a method for developing academic English writing skills by using translation support tools* [Grant]. Tohoku University. https://cir.nii.ac.jp/crid/1040295802070308864

Omote, A. (2020). *Non-AI non-NS Japanese of the English teacher in Japan: developing Japanese can-do statements in English classroom* [Grant]. International University of Health and Welfare. https://cir.nii.ac.jp/crid/1040848250652577408

OpenAI. (2023). *ChatGPT [Large language model]*. https://chat.openai.com/chat

Oxford Reference. (2023). Artificial intelligence. In https://www.oxfordreference.com/display/10.1093/oi/authority.20110803095426960

Pack, A., & Maloney, J. (2023). Using Generative Artificial Intelligence for Language Education Research: Insights from Using OpenAI's ChatGPT. *TESOL Quarterly*, *57*(4), 1571-1582. https://doi.org/10.1002/tesq.3253

Randall, T. S., & Urbanski, K. (2023). Development of a Computerized Dynamic Assessment Program for Second Language Grammar Instruction and Assessment. *Language & Sociocultural Theory*, *10*(1). https://doi.org/10.1558/lst.21006

Renzella, J., Cain, A., & Schneider, J.-G. (2022). Verifying student identity in oral assessments with deep speaker. *Computers and Education: Artificial Intelligence*, *3*, 100044. https://doi.org/10.1016/j.caeai.2021.100044

Ri, K. (2021). *Development and practice of an online AI analytics support system for sustainable English learning* [Grant]. Dokkyo University. https://cir.nii.ac.jp/crid/1040287907249644672

Richards, J. C. (2013). *New interchange 1.* [5th ed.] Cambridge, Cambridge University Press.

Rebolledo Font de la Vall, R., & Gonzalez Araya, F. (2023). Exploring the benefits and challenges of AI-language learning tools. *International Journal of Social Sciences and Humanities Invention, 10*(1). http://dx.doi.org/10.18535/ijsshi/v10i01.02

Rokhman, N., & Kobar, S. A. (2022). Intelligent Tutoring Systems Authoring Tools For Nonprogrammer Authors: A Systematic Review. *SISFORMA*, *9*(1), 1-8. https://doi.org/10.24167/sisforma.v9i1.3022

Rudolph, J., Tan, S., & Tan, S. (2023). ChatGPT: Bullshit spewer or the end of traditional assessments in higher education? *Journal of Applied Learning and Teaching*, *1*, *6*(1), 342-263. https://doi.org/10.37074/jalt.2023.6.1.9

Saito, T. (2023). *A Study of Self-modification Possibilities in Human-AI collaborative English Writing* [Grant]. Teikyo University. https://cir.nii.ac.jp/crid/1040014327093578624

Sakamoto, M. (2019). *Development of Readability Index for EFL Learners with Artificial Intelligence* [Grant]. Kagoshima National College of Technology. https://cir.nii.ac.jp/crid/1040000782015926912

Sha, G. (2009). Using TTS voices to develop audio materials for listening comprehension: A digital approach. *British Journal of Educational Technology. 41*. 632 - 641. http://dx.doi.org/10.1111/j.1467-8535.2009.01025.x

Shishido, M. (2021). *AI・sentakushi-gata chatto botto wo riyou shita eikaiwa shisutemu no kaihatsu to eigo ryoku no koujou no kenshou* [Development of an English conversation system using AI and choice-based chatbots and verification of improvement in English proficiency]. [Grant]. Tokyo Denki University. https://cir.nii.ac.jp/crid/1040006432266949760

Sholekhah, M. F., & Fakhrurriana, R. (2023). The Use of ELSA Speak as a Mobile-Assisted Language Learning (MALL) towards EFL Students' Pronunciation. *JELITA: Journal of Education, Language Innovation, and Applied Linguistics*, *2*(2), 93-100. https://doi.org/10.37058/jelita.v2i2.7596

Son, J.-B., Ružić, N. K., & Philpott, A. (2023). Artificial intelligence technologies and applications for language learning and teaching. *Journal of China Computer-Assisted Language Learning*. Advance online publication. https://doi.org/10.1515/jccall-2023-0015

Spring, R. (2022). *Creation of automated speaking/writing assistant tools for EGAP* [Grant]. Tohoku University. https://cir.nii.ac.jp/crid/1040854882536699776

Stringer, T. (2023, July 14). *GPTeaching: Embracing Generative AI, Empowering Autonomous Language Learning* [Conference Presentation]. RILAE 10th LAb Session, Kanda University of International Studies, Japan. https://youtu.be/_gdD-MOl0a0

Stringer, T., & Eberly, L. (2023, October 20-21). *Empowering EFL Learners and Teachers: Harnessing AI for Writing Instruction* [Conference Presentation]. 20th Technology for Second Language Learning (TSLL) Conference: Advancing Technologies — Expanding Research, Iowa State University, United States. https://youtu.be/5lrgdx6RrIw

Sugisaki, S. (2019). *Gurōbaru shakai ni okeru kokugo-ryoku ikusei no tame no 'tegaki' o ikashita ICT kyōzai no kentō* [Consideration of ICT teaching materials utilizing 'handwriting' for the development of language skills in a global society]. [Grant]. Shizuoka University. https://cir.nii.ac.jp/crid/1040282256993466624

Tai, T.-Y., & Chen, H. H.-J. (2023). The impact of Google Assistant on adolescent EFL learners' willingness to communicate. *Interactive Learning Environments*, *31*(3), 1485-1502. https://doi.org/10.1080/10494820.2020.1841801

Takimura, H. (2023). *Kikai honyaku jidai no gaikokugo kyouiku wo tankyuu suru* [Exploring foreign language education in the era of machine translation]. [Grant]. Tokyo Denki University. https://cir.nii.ac.jp/crid/1040295802070319104

Tanaka, E. (2023). *Eigo AI tsuuru wo mochiita eigo raitingu sukiru no ninchi kagakuteki, gengogakuteki bunseki* [Cognitive and linguistic analysis of English writing skills using English AI tools]. [Grant]. Shinshu University. https://cir.nii.ac.jp/crid/1040577277047954560

Timpe-Laughlin, V., Sydorenko, T., & Daurio, P. (2022). Using spoken dialogue technology for L2 speaking practice: what do teachers think? *Computer Assisted Language Learning*, *35*(5-6), 1194-1217. https://doi.org/10.1080/09588221.2020.1774904

Trew, G. (2007). *A Teacher's Guide to TOEIC Listening and Reading Test. Preparing Your Students for Success*. Oxford University Press. https://elt.oup.com/elt/students/exams//pdf/elt/toeic_teachers_guide_internat ional.pdf

Um, H., Kim, H., Choi, D., & Oh, H. (2023). An AI-based English education platform during the COVID-19 pandemic. *Universal Access in the Information Society*. https://doi.org/10.1007/s10209-023-01046-2

Xu, Y., Wang, D., Collins, P., Lee, H., & Warschauer, M. (2021). Same benefits, different communication patterns: Comparing Children's reading with a conversational agent vs. a human partner. *Computers & Education*, *161*, 104059. https://doi.org/10.1016/j.compedu.2020.104059

Yamazaki, A. (2022). *Rikoukei eigo purezentēshon no tame no VR kyouzai kaihatsu to kyouiku kouka kenshou* [Development of VR teaching materials for science and engineering English presentations and verification of educational effectiveness]. [Grant]. Digital Hollywood University. https://cir.nii.ac.jp/crid/1040291932574484352

7. APPENDICES

Appendix A: CiNii Database Search Results

A table showing the 24 results of a CiNii database search conducted on December 4th, 2023, for approved public research grants in place in 2023 related to AI and language education in Japan, arranged in reverse chronological order by approval year

Research Grant Title (transliteration) [translation] (primary investigator, award year)
1. A Study of Self-modification Possibilities in Human-AI collaborative English Writing (Saito, 2023)
2. Research and development of a method for developing academic English writing skills by using translation support tools (Okada, 2023)
3. 機械翻訳時代の外国語教育を探求する (*Kikai honyaku jidai no gaikokugo kyouiku wo tankyuu suru)* [Exploring foreign language education in the era of machine translation] (Takimura, 2023)
4. AI 技術等を活用し、個別最適な学びを充実させる小学校英語教材の開発 (*AI gijutsu tou wo katsuyou shi, kobetsu saiteki na manabi wo juujitsu saseru shougakkou eigo kyouzai no kaihatsu)* [Development of elementary school English teaching materials that utilize AI technology and other means to enrich individually optimized learning (Higashiguchi, 2023)
5. 共起辞書と AI 技術を用いた日本人英語学習者のためのリーダビリティ予測モデルの開発 (*Kyouki jisho to AI gijutsu wo mochiita nihonjin eigo gakushuusha no tame no riidabiriti yosoku moderu no kaihatsu)* [Development of a readability prediction model for Japanese English learners using collocation dictionaries and AI technology] (A. Nakano, 2023)
6. 英語 AI ツールを用いた英語ライティングスキルの認知科学的・言語学的分析 (*Eigo AI tsuuru wo mochiita eigo raitingu sukiru no ninchi kagakuteki, gengogakuteki bunseki)* [Cognitive and linguistic analysis of English writing skills using English AI tools] (Tanaka, 2023)

7. LLM-based Learning Assistance for Python and Data Science Education (Kuramitsu, 2023)

8. The Development of Mathematical Models using Machine Learning with Educational Big Data for Language Acquisition and Individually Optimized Learning (Kaneko, 2023)

9. A quantitative analysis research on the correlation between the embodiment principles and the development of metalinguistic ability in foreign language acquisition (K. Nakano, 2023)

10. 国際的医療人育成のための AI を活用した英語医療面接自動採点システムの開発 (*Kokusai-teki iryōjin ikusei no tame no AI o katsuyō shita Eigo iryō mensetsu jidō saiten shisutemu no kaihatsu)* [Development of an AI-based automatic scoring system for English medical interviews for international medical personnel training] (Chidlow, 2023)

11. 小学校英語教育における児童に最適化された AI アバターの開発と現場への導入 (*Shougakkou eigo kyouiku ni okeru jidou ni saitekika sareta AI abataa no kaihatsu to genba e no dounyuu)* [Development and implementation of AI avatars optimized for children in elementary school English education] (Nakamura, 2022)

12. 理工系英語プレゼンテーションのための VR 教材開発と教育効果検証 (*Rikoukei eigo purezentēshon no tame no VR kyouzai kaihatsu to kyouiku kouka kenshou)* [Development of VR teaching materials for science and engineering English presentations and verification of educational effectiveness]. (Yamazaki, 2022)

13. Creation of automated speaking/writing assistant tools for EGAP (Spring, 2022)

14. AI・選択肢型チャットボットを利用した英会話システムの開発と英語力の向上の検証 (*AI・sentakushi-gata chatto botto wo riyou shita eikaiwa shisutemu no kaihatsu to eigo ryoku no koujou no kenshou)* [Development of an English conversation system using AI and choice-based chatbots and verification of improvement in English proficiency] (Shishido, 2021)

15. Development and practice of an online AI analytics support system for sustainable English learning (Ri, 2021)

16. AI 翻訳を用いた多言語運用能力の習得と言語学習環境の構築・言語教育の在り方の解明 (*AI honyaku wo mochiita tagengo unyou nouryoku no shuutoku to gengo gakushuu kankyou no kouchiku・gengo kyouiku no arikata no kaimei)* [Acquisition of multilingual proficiency using AI translation, construction of language learning environments, and elucidation of the nature of language education] (Nozaki, 2021)

17. Development of a Semi-Automatic Scoring System using AI (Kaneko, 2020)

18. AI 技術を用いた日本人英語学習者のためのリーダビリティ予測モデルの開発 (*AI gijutsu wo mochiita nihonjin eigo gakushuusha no tame no riidabiriti yosoku moderu no kaihatsu)* [Development of a readability prediction model for Japanese English learners using AI technology] (A. Nakano, 2020)

19. Non-AI non-NS Japanese of the English teacher in Japan: developing Japanese can-do statements in English classroom (Omote, 2020)

20. オートリンガル時代における言語運用能力像の構築と新学習戦略の実践 (*Otoringaru jidai ni okeru gengo unyou nouryoku zou no kouchiku to shin gakushuu senryaku no jissen)* [Constructing a vision of language proficiency in the autolingual era and implementing new learning strategies] (Katata, 2019)

21. Development of Readability Index for EFL Learners with Artificial Intelligence (Sakamoto, 2019)

22. A study on English education using AI, VR, and ICT (Kobari, 2019)

23. グローバル社会における国語力育成のための「手書き」を生かした ICT 教材の検討 (*Gurōbaru shakai ni okeru kokugo-ryoku ikusei no tame no 'tegaki' o ikashita ICT kyōzai no kentō)* [Consideration of ICT teaching materials utilizing 'handwriting' for the development of language skills in a global society] (Sugisaki, 2019)

24. New method of evaluating English speaking ability using AI (Azuma, 2018)